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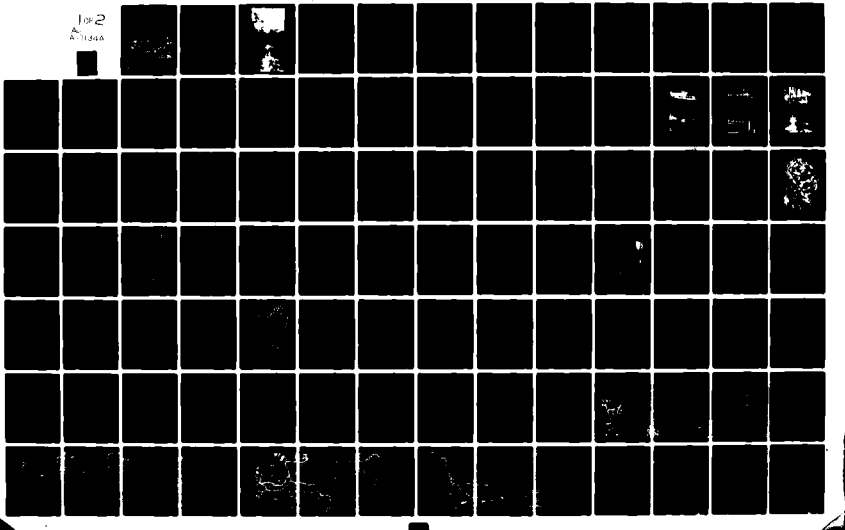

ELLICOTT CREEK BASIN
LEVEL III
NEW YORK

PHASE 2
VOLUME 1
MAIN REPORT

U.S. ARMY CORPS OF ENGINEERS
BUFFALO DISTRICT
ESSAYONS

WATER RESOURCES DEVELOPMENT

AUGUST
1973

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Water Resources Development
Ellicott Creek

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

Increasing population, urbanization and planned development with in the next few years by the State University of New York (SUNYAB), Urban Development Corporation (UDC), New York State Department of Transportation (DOT), and Planned Environment Systems incorporated require effcient use of water resources in the Ellicott Creek Basin. There is, therefore, an increasing demand for water supply, flood control, outdoor recreation, water quality, preservation of the natural environment, and fish and wildlife conservation. The report is a restudy of a survey report completed in 1970 that recommended construction of a dam

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PHASE 2, VOLUME 1, MAIN REPORT
ELLICOTT CREEK BASIN, NEW YORK (AUGUST 1973)

PEN AND INK CHANGES

Page No.	Change		
26	In paragraph 13.3 add "In accordance with Section 3 of the 1936 Flood Control Act, non-Federal interests are entitled to reimbursement of one-half of the excess of their costs over Federal costs."		
26A	Add to bottom of Table 13.1-		
	REIMBURSEMENT OF 1/2 EXCESS NON-FEDERAL COSTS	1,154,000	-1,154,000
	NET SUBTOTALS	5,449,000	5,449,000
	TOTAL		10,898,000
26B	Revise Table 13.2 to read:		
	INTEREST	307,000	307,000
	AMORTIZATION	1,500	1,500
	OPERATION AND MAINTENANCE	700	25,300
		309,200	333,800
	Revise Table 13.3 to read:		
	AVERAGE ANNUAL COSTS	643,000	
	NET BENEFIT	434,000	

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LIST OF PLATES

Number	Title
1	Basin Map
2	Flooded Areas, Mile 0 to 10
3	Flooded Areas, Mile 10 to 22
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8	Sandridge Dam Plan and Section and Harlow Road Section
9	Damage Reaches and Flooded Area Map
10	Bowmansville Lake

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Photo 1	Flooding in Ellicott Creek County Park, March 1936 Flood
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Photo 3	Flooding in the Town of Amherst, March 1956 High Water Occurrence
Photo 4	Flooding in the City of Tonawanda, January 1959 Flood
Photo 5	Flooding in Village of Williamsville, March 1960 Flood
Photo 6	Flooding in Town of Cheektowaga, March 1960 Flood

INTRODUCTION

This Main Report, the second Volume entitled Appendices, and the Environmental Impact Assessment, present the concluding stages of the Ellicott Creek Review Survey.

The Main Report is a general, non-technical presentation of a feasibility study of four alternative schemes for flood control and other desirable improvements along Ellicott Creek. These four alternatives have been selected for Phase 2 detailed study from a total of thirty alternatives initially examined in Phase 1 of the Review Survey. The selection has been made on the combined basis of general public desire as expressed at public meetings, after open discussion with civic groups and organized, responsible societies, and the professional considerations of Consultant and the Buffalo District Corps of Engineers.

The Appendices supply the technical details of the Review Survey.

The Environmental Impact Assessment describes the factors and considerations and conditions affecting Basin residents now, and the changes, for good or ill, which the proposals will cause.

The Phase 2 study has been greatly facilitated by the contributions and considerable assistance of the staff of the Buffalo District Corps of Engineers. Grateful acknowledgement is made of this fact.

1 - THE STUDY AND REPORT

1.1 - General

The Ellicott Creek Basin covers some 110 square miles, a very minor part of the Erie Niagara Basin. Ellicott Creek itself is 47 miles long, relatively a short creek. However, in its lower reaches the Creek flows through a flat area, and in late-winter/early spring this small creek has an historic reputation for overflowing its banks and spreading destruction and misery in its wake. In midsummer there is very little flow in the creek, with ensuing objectionable visual and olfactory effects. The Basin area is recreation deficient. The study has been necessary to discover a solution to these factors that will generally satisfy the population of the Basin.

1.2 - Purpose and Authority

A project was proposed by the Corps of Engineers in May 1970. It centered on a multi-purpose reservoir near Alden, providing flood control for a 100-year flood, water oriented recreation, a fish and wild life area, low flow augmentation capability and a potential for water supply. Section 201 of the Rivers and Harbors Act authorized the project, subject to an investigation of all possible alternatives to suitably resolve the problem. This report results from that authorization.

1.3 - Scope of the Study

The requirement that all possible alternatives be examined to decide if the 1970 proposed Sandridge Reservoir were the most suitable has resulted in 31 flood control proposals being examined. These 31 alternatives fall into the broad classifications of channelization, diversion, reservoirs, levees, floodplain management, public acquisition, or even a combination of some of these classifications. Costs and benefits have been evaluated in each

case and the environmental impact assessed. These studies were presented in a Phase 1 Report. Information on these thirty-one proposals is given in the Plan Formulation section. The thrity-one proposals were narrowed to four for detailed examination. The study of these four alternatives and the selection from them of a recommended plan forms the subject matter of the Phase II Report.

1.4 - Study Participants and Coordination

A feature of this study has been the public participation in it and the coordination with other agencies. In addition to the public meeting held in March 1970, public workshops have been held in July and September 1972 and March 1973 and public meetings in August and September 1972 and March 1973. Constant contact and liaison have been maintained with affected governmental departments and agencies such as the Erie-Niagara Counties Regional Planning Board, the New York State Department of Environmental Conservation, Erie County, The Urban Development Corporation Amherst, N.Y., Amherst Town Engineer, the Sierra Club, The Amherst League of Women Voters, Amherst Conservation Council, Alden Town, The State University Construction Fund, etc.

1.5 - The Report

The report is a Review Survey Report and is presented in five books. The preliminary review of the 31 proposals is presented in two books entitled "Review Survey Report, Phase 1", and a Supplement to the Report. The detailed examination of the four most promising alternatives is presented in two further books, being a Main Report entitled "Review Survey Report, Phase 2, Volume 1" and Appendices to the Main Report, entitled "Review Survey Report, Phase 2, Volume 2 ". The fifth book is the Environmental Impact Assessment.

1.6 - Prior Studies and Reports

A preliminary examination of Ellicott Creek for flood control was done in early 1939 and a report submitted in April 1939. No work was recommended and the report was

not published.

A flood plain information report on Ellicott Creek was prepared by the Corps of Engineers in January 1968 at the request of the Erie County Department of Public Works. It shows flood outlines along the Ellicott Creek channel, from the mouth to a point 22 miles upstream. The report warns of the danger of unwise development in areas subject to flooding.

A comprehensive study of the Erie-Niagara Basin, which includes Ellicott Creek, was conducted by the Erie-Niagara Basin Regional Water Resources Planning Board. The report, completed in 1969, recommended a multiple-purpose reservoir and downstream channel improvement on Ellicott Creek as part of their early-action program.

The Corps of Engineers, in a joint study with the State of New York, submitted a survey report for flood control and allied purposes on Ellicott Creek in May 1970. The report listed three justified alternatives for development of the water and related land resources of the Ellicott Creek Basin. These alternatives were:

a. A major channel improvement in the downstream reaches of Ellicott Creek

b. A multiple-purpose reservoir at the Sandridge site

c. The Sandridge Reservoir in combination with minor downstream channel improvement in Ellicott Creek

Alternative C was recommended as a project.

2 - BASIN DESCRIPTION

2.1 - Geography

Ellicott Creek is the largest tributary of Tonawanda Creek and drains an area of approximately 110 square miles in Erie, Genesee and Wyoming Counties. The source of the principal tributary, Elevenmile Creek, is about 22 miles

east of Buffalo, at an elevation of about 1,300 feet above mean sea level. It joins Crooked Creek to form Ellicott Creek, which flows in a northwesterly direction into the canalized section of Tonawanda Creek at an elevation of about 564 feet. The topography of the watershed varies from flat lands near the mouth to steep hills around the headwaters. Near the headwaters the stream flows through steep valleys and is fed by small streams and gullies from the hillsides. Ellicott Creek then pursues a very meandering course and achieves a total length of approximately 47 miles in a basin roughly 27 miles long. Plate 1 shows the entire Ellicott Creek basin.

2.2 - Topography

The Ellicott Creek watershed lies within the western portion of the Erie-Ontario lowland, which is bounded on the north by Lake Ontario and on the south by the Allegheny Plateau. The generally flat to rolling lowland surface is interrupted by three east-west trending escarpments known as the Niagara, Onondaga and Portage Escarpments, the latter forming the northern edge of the Allegheny Plateau. The lowland belts, delineated by the escarpments, are named, from north to south, the Ontario Plain, the Huron Plain and the Lake Erie Plain. From its headwaters on the Portage Escarpment, Ellicott Creek flows over the Lake Erie Plain for about two-thirds of its length before cutting northward across the Onodaga Escarpment onto the Huron Plain, thence joining the Niagara River.

2.3 - Geology and Soils

The bedrock underlying the western portion of the lowland consists of sedimentary strata - limestone, dolomite, shale, siltstone and sandstone - ranging in age from late Ordovician through late Devonian. These strata form a homocline structure which trends east-west and dips gently southward. The bedrock surface largely is covered with glacial deposits associated with Wisconsin stage glaciation.

2.4 - Channel Characteristics

The location of the most concentrated flood damages on Ellicott Creek is in the town of Amherst along the lower end of the stream (see Plate 1). Inundation of low areas commences at the fairly modest flow rate of 2100 c.f.s. Rock appears in the channel bottom in the vicinity of Millersport Highway, and in Williamsville exhibits itself in scenic falls. Channel capacity is very limited just upstream of Buffalo Airport and also Harris Hill Road, resulting in frequent and severe flooding (see Plates 2 and 3). Backwater from Tonawanda Creek (New York State Barge Canal) extends upstream for about 5 miles above the creek mouth.

2.5 - Maps

The Ellicott Creek basin is shown on Plate 1 accompanying this report and on the following United States Geological Survey Maps at a scale of 1:24,000 with ten-foot contour interval: Alexander, Attica, Buffalo Northeast, Clarence, Clarence Center, Corfu, Cowlesville, Lancaster and Tonawanda East.

3 - ECONOMIC DEVELOPMENT

3.1 - Population

The Ellicott Creek basin is shown in Plate 1. Table 3.1 shows total populations of governmental units in the basin, as listed in United States Census returns for 1940, 1950, 1960, and 1970. Because of differences in census and watershed boundaries, basin population cannot be determined accurately.

Historic population trends in both Erie County and the Ellicott Creek basin show a continuous growth. From 1940 to 1970 Erie County's population grew by 39 percent, while the basin as a whole increased a slightly lesser percentage. However, residential development in the town of Amherst has been particularly rapid in recent years and will be accelerated by a new State University campus being

TABLE 3.1

POPULATION

Ellicott Creek Basin[1/]	Historical				Projected[2/]	
	1940	1950	1960	1970	1980	1990
Alden town	4,613	4,899	7,615	9,787	12,931	16,173
Alden village	954	1,252	2,042	2,651	3,280	4,330
Amherst town	19,356	33,744	62,837	93,929	117,555	143,076
Williamsville village	3,614	4,649	6,316	6,835	6,320	6,320
Bennington town, Wyoming	1,481	1,558	1,983	2,544	3,203	4,028
Buffalo city	575,901	580,132	532,759	462,768	416,146	385,683
Cheektowaga town	25,006	45,354	84,056	113,844	129,311	140,587
Clarence town	4,426	6,331	13,267	18,168	22,335	26,126
Darien town, Genesee	1,667	1,899	2,357	2,745	3,277	4,002
Lancaster town	15,299	18,471	25,605	30,634	35,266	39,812
Newstead town	4,268	4,653	5,825	6,322	7,053	8,708
Pembroke town	2,391	2,866	3,451	3,959	4,589	5,458
Tonawanda city	13,008	14,617	21,561	21,898	22,335	22,394
Tonawanda town	32,155	55,270	105,032	107,282	108,151	111,972
Kenmore village	18,612	20,066	21,261	20,980	21,260	21,260
T o t a l	699,571	769,794	866,528	873,880	882,152	908,019
Regional						
Erie County	798,377	899,238	1,064,688	1,112,368	1,163,787	1,231,684

1/ Town populations also include village population
2/ Prepared by NYS Office of Planning Services

constructed on the fringe of the flood plain in Amherst. Its impact has not yet been fully evaluated, but preliminary estimates suggest that about one-quarter of the population increase of the Buffalo area through 1985 will be attributable to the campus development. By 1975, the daily population of the Amherst campus is expected to be more than 50,000 persons, including students, faculty and service employees.

3.2 - Land Use

Development in the first mile of Ellicott Creek is commercial and industrial. Then, through the remainder of the city of Tonawanda, the town of Tonawanda and the town of Amherst to the upper limit of Williamsville, development is essentially residential of varying degrees of intensity, interspersed with parks, golf courses, shopping centers and vacant land. A large sparsely developed area on the left bank in Amherst has been acquired by the State University of New York, which has started construction of the new campus discussed in the previous paragraph. Immediately upstream from Williamsville, the basin was once entirely agricultural, but is gradually changing to suburban residential development whose intensity is greatest near Buffalo. In the interim, many of the farms have either been combined into larger units for dairy and general farming or are dormant, with the buildings in use but the land uncultivated. Private enterprise is planning to construct a domed stadium just south of the creek in the town of Lancaster. Private interests are planning peripheral development of motels, apartments and shopping centers. The upstream portion of the basin is used mainly for agricultural purposes.

3.3 - Resources

Along the northern edge of the basin, glacial deposits and the underlying limestone are being worked to obtain concrete aggregates. Natural gas is obtained at some points in the basin in small quantities.

3.4 - Transportation

The Ellicott Creek basin is roughly parallel to three railroads, the New York State Thruway and two other major highways. With a network of improved local roads, there is good access to all parts of the basin. Buffalo International Airport, located partly within the basin, provides regular airline service.

The proposals for a Lockport Expressway envisage a major transportation route cutting across the basin, generally from south-west to north-east, in the Amherst area.

3.5 - Water Supply and Waste Treatment

The cities of Buffalo and Tonawanda, and the town of Tonawanda have individual water supply systems drawing upon Lake Erie or the Niagara River. Erie County Water Authority supplies large areas, as far afield as Lancaster. Upstream areas have private supplies. Sewerage systems in the lower basin discharge through treatment plants to the Niagara River directly or by way of tributaries other than Ellicott Creek. Systems serving part of the town of Amherst and the village of Alden discharge into Ellicott Creek. During periods of low flow, there are extensive growths of algae along the entire stream.

3.6 - Employment Trends

The downstream reaches of the Ellicott Creek basin are located within the most dynamic portion of the Buffalo Standard Metropolitan Statistical Area (SMSA). The communities of Amherst, Tonawanda and Cheektowaga have accounted for nearly two-thirds of the population growth in the Buffalo metropolitan area in recent years.

3.6.1 - Manufacturing

Manufacturing employment in the Buffalo SMSA will probably increase by one-third during the next sixty years, as increased production requirements will be met largely by improved technology rather than

increases in manpower.

3.6.2 - Non-Manufacturing

Non-manufacturing jobs in the Buffalo SMSA are expected to expand by about two and one-half times by 2020. All significant non-factory lines in the metropotitan area should show substantial gains as the area and the nation continue to shift from a goods-producing to a service economy.

3.6.3 - Agriculture

The absolute decline of the agricultural sector as a job source in the Buffalo SMSA from just less than four percent in 1940, to just over one percent in 1960, and to about one-third of one percent by 2020, will reflect striking output-per-farm-worker gains rather than a decline in volume of farm output.

The employment impact, direct and indirect, associated with the new State University of New York at Buffalo is estimated to provide nearly 51,000 additional jobs in the Buffalo area by 1985. Many of these jobs will be in or adjacent to the basin. Resulting concomitant demands for housing, as forecast household formations occur, are expected to total nearly 70,000 units by 1985. Translation of the many needs of these household and related employments into reality augurs well for the economic health of the Buffalo SMSA.

4 - CLIMATOLOGY

4.1 - Stations

There are no climatological stations located in the Ellicott Creek basin. Seven precipitation stations and one first order weather station are located adjacent to the basin. The first order weather station is located at the Greater Buffalo International Airport.

4.2 - Precipitation

The average annual precipitation for the eight stations is 35.36 inches. The monthly averages vary from a minimum of 2.50 inches in February to a maximum of 3.26 inches in August.

4.3 - Snowfall

The average annual snowfall for all the stations is 80.6 inches. The highest average monthly snowfall is 22,4 inches in January at Arcade.

4.4 - Temperature

The average annual temperature, for the six stations recording temperature, is 46.6 degrees Fahrenheit. July is the warmest month and January the coldest, with average monthly temperatures of 69.2 and 23.3 degrees Fahrenheit, respectively.

5 - RUNOFF AND STREAMFLOW DATA

5.1 - Streamflow Records

Two continuous recording stream gaging stations have been operated by the U.S. Geological Survey on Ellicott Creek in Erie County, New York. One, located in Williamsville, measures the discharge from an area of 75.0 square miles and has been in operation since 1955. The other was located on Walden Avenue bridge in Millgrove and measured the discharge from an area of 40.7 square miles. The Erie County Department of Public Works has maintained staff gages at the Niagara Falls Boulevard and Stony Road bridge sites since 1961.

5.2 - Runoff

The normal runoff pattern of Ellicott Creek shows that dependable high flow occurs during the snow melt period of February-April with accompanying rains. Intermittent and short high-flow periods may occur throughout the year from

rainfall runoff; and occasional high flow discharge can be expected from rains in the November-January period, when partial snow melt and runoff from frozen ground occurs with a storm. During the summer months, flows can be very low.

6 - FLOODS

6.1 - Maximum Known Floods

Historical documents state that two floods of approximately equal magnitude occurred in March 1916 and January 1929. The greatest known flood in the study area occurred on 17 March 1936. The Maximum recorded flood occurred in March 1960 as a result of 5 days of snowmelt which caused a large amount of runoff from the eight inches of snow covering the area. Other floods probably occurred prior to 1916 but no definite dates or stages can be established because of the lack of development and records in the area at the time.

6.2 - Flood Frequency

Under present conditions, a flood discharge equal to that of March 1936, may be expected to recur on an average of once in about 50 years. The March 1960 flood, the largest with which most residents of the area are familiar, can recur about once in 20 years. As development of upstream areas continues, it will change rates of infiltrations and runoff, and floods of these discharges may be expected to recur at slightly shorter intervals.

7 - WATER RELATED PROBLEMS AND NEEDS

7.1 - General

As the Buffalo metropolitan area expands, needs are being created for flood protection, water supply and improved water quality. The growing population has increasing needs for water-oriented recreational opportunities. The study completed by the Erie-Niagara Basin Board has developed

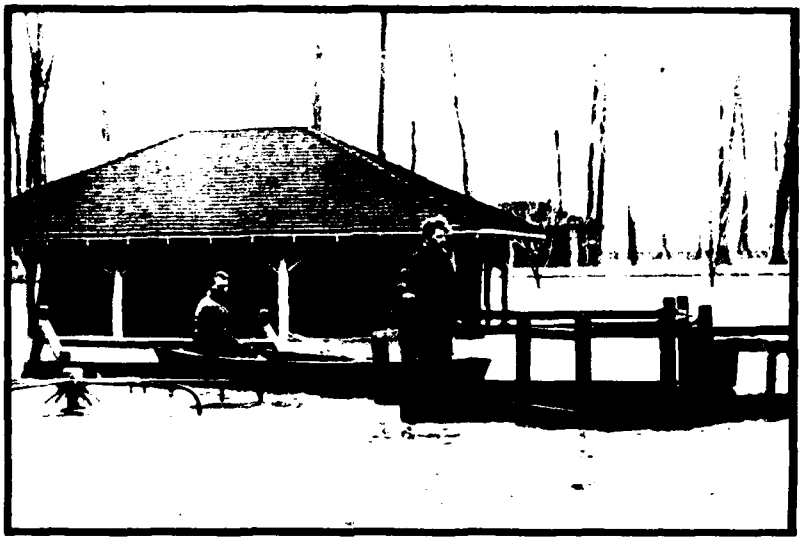


PHOTO 1- Photo showing the depth of flooding in Ellicott Creek County Park during the March 1936 flood. This park is located in the town of Tonawanda. Even with the depth of flooding indicated, only minor damages were sustained to the park and its facilities. Example of excellent flood plain usage.

PHOTO 2 - Photo showing flooding conditions on Sweet Home Road near the intersection of North Ellicott Creek Road near creek mile 4.8 in the town of Amherst during the March 1936 flood.

PHOTO 3- Photo showing flooding conditions on North Forest Road near the intersection of Maple Road in the town of Amherst, near creek mile 9.3 during the March 1956 high water occurrence. This intersection is the initial point where Ellicott Creek overflows its banks.

PHOTO 4- Photo showing flooding conditions on Frederick Road in the city of Tonawanda, near creek mile 1.5, during the January 1959 flood.

PHOTO 5- Photo showing flooding conditions in the vicinity of Lehn Springs Drive in the village of Williamsville during the March 1960 flood.

PHOTO 6 - Photo shows flood water flowing over Rein Road near creek mile 16.1 in the town of Cheektowaga during the March 1960 flood.

information on the overall needs of the area. In that study and in more detail in this study, consideration has been given to selection of projects in the Ellicott Creek basin to meet needs peculiar to the basin and to meet in part the more general needs of the area. There are no apparent needs in the basin for agricultural irrigation or development of hydroelectric power.

7.2 - Extent and Character of Flooded Area

Plates 2 and 3 illustrate the extent of flooding, under present conditions, caused by a 20-year flood, 100-year flood and the Project Flood. The 20-year flood is the type experienced in the basin in 1960.

The 1960 flood inundated about 3220 acres in Amherst and Tonawanda. This area is primarily residential. The flooded area in this locality had a maximum width of about 3000 ft. Furthur upstream, at Cheektowaga, 450 acres were inundated, with a maximum width of flooding of some 4000 ft. Fortunately this area has large, undeveloped, open spaces. The main runway of Buffalo airport travesses this locality on fill. In Lancaster the same flood put 890 acres under water.

Upstream of Lancaster, the predominant land use is farming. Though the extent of farming has diminished in recent years, many prosperous farms still operate in the area.

7.3 - Flood Damage Surveys

A preliminary survey of areas flooded in March 1960 downstream of Stony Road was completed in 1963. Because of widespread new development, the area below Sheridan Drive was resurveyed in the spring of 1969. Property owners, tenants and public officials were interviewed and data were obtained on actual damages at the 1960 flood level and extimated damages at higher and lower levels, at almost all commercial, public and utility units, and at a representative group of residential units.

Damages in a recurrence of the 1960 flood, referenced to March 1969 price levels and conditions of development are estimated at $2,027,000 in the reach between the mouth of the creek and Alden. Of this amount, $1,875,000 would occur in Amherst and Tonawanda.

7.4 - Computation of Average Annual Damages

To compare damages under existing conditions with those to be expected after improvement, the flood area has been divided into reaches, selected so that, within each, there would be an index point at which stage-damage relations for existing conditions would be representative of the entire reach, and at which the effects of an improvement plan on that relation would be uniform throughout the reach. Plate 9 illustrates the selected reaches.

7.5 - Water Oriented Recreation

Dramatic increases in population, urbanization, leisure time, income, and mobility have brought about an explosion in demand for outdoor recreation in the United States, especially since World War II. Recreation attendance over the past decade at Corps of Engineers reservoirs has increased at a compound rate of about 23 percent per year while visitation at T.V.A. reservoirs has grown at the rate of 12 percent. Like the rest of the United States, western New York has witnessed substantial growth in outdoor recreation activity and can expect future increases.

TABLE 7.1 - Regional recreation needs (Instantaneous participation on typical summer Sunday)

Activity	1970	1980	2000	2020
Swimming	87,600	108,500	156,000	206,000
Boating	29,700	37,600	56,200	74,500
Camping	3,400	10,500	26,600	42,500
Picnicking	(5,500) 1/	8,000	38,000	68,000
Total Requirements	115,200	164,600	276,800	391,000

1/ Supply greater than demand

7.6 - Water Quality Management

Water quality requirements for streams in New York have been established by the New York Water Resources Commission. Discharges to waterways in New York State require a minimum of secondary treatment, capable of removing at least 75 percent of the five-day BOD before discharge. In addition, the effluent must be treated to a degree which will permit maintaining the required minimum dissolved oxygen concentration established by stream classifications. Several other requirements are included in the standards, all of which are normally readily met by sewage treatment plants providing secondary treatment. Inasmuch as Ellicott Creek does not have any great flow during the minimum flow periods, the dissolved oxygen requirement is quite critical.

7,7 - Municipal Water Supply

Population centers which could benefit from water supply from an upstream reservoir on Ellicott Creek are the town of Alden, the village of Alden, the town of Darien, and the village of Akron and town of Newstead. Supplies to suburban areas closer to Buffalo will be provided by the Erie County Water Authority from Lake Erie.

7.8 - Fish and Wildlife

Fishing opportunities in the Buffalo area are limited in quantity and low in quality. Low summer flows and poor water quality have reduced fish populations in most inland streams, and weather often restricts use of the Great Lakes. Studies of fishery requirements show that in 1960 the resource provided anglers with only 0.1 pound per fisherman-day, compared with a national average of 1.5 pounds. The spread of suburban growth and increased posting of private lands have similarly restricted hunting opportunities, although the trend toward disuse of agricultural land has improved game production.

8 - EXISTING IMPROVEMENTS

In 1929, the Village of Williamsville, at a cost of about $64,000, executed a flood control project just upstream of the Williamsville Falls. It consisted of: a new channel about 1,100 feet long with a bottom width of 70 feet; cleaning, deepening and widening the existing channel immediately upstream of the new channel for a distance of about 1,400 feet and construction of a small gate controlled dam at the lower end of the new channel. The gates are normally closed to maintain a pool for scenic purposes and are opened as needed to provide extra channel capacity for flood flows.

In 1932, the Town of Amherst made channel improvements at a cost of $25,000, consisting of cleaning, deepening and widening the creek upstream of the Williamsville village limit for a distance of about 2,800 feet. Later that year, the Village of Williamsville did some widening and levee work upstream of the town project. The cost of these improvements was about $15,000 but the extent of the project is not known. These projects afforded protection to the land immediately adjacent thereto, and increased the efficiency of the flood control project described in the preceding paragraph.

The Federal Government expended $75,700 in 1958 and 1959 for clearing and snagging a seven-mile reach of Ellicott Creek between Sheridan Drive and Niagara Falls Boulevard. Maintenance has been performed by local interests.

Erie County constructed a diversion channel between Ellicott Creek and Tonawanda Creek in 1965 at a cost of about $300,000. Since Ellicott Creek normally reaches peak flood stages earlier than Tonawanda Creek, the channel diverts part of the high flow on Ellicott Creek to Tonawanda Creek.

9 - IMPROVEMENTS DESIRED

At a public hearing on Tonawanda Creek and its tributaries for flood control, held in Clarence Center on 29 November 1960, information was presented on the extent of damage caused by Ellicott Creek in and downstream from Williamsville. Provision of measures to reduce this damage was requested but no specific plan of improvement was suggested.

At the meeting held to present the Ellicott Creek flood plain information report, Town of Amherst officials stated that they could not accept that report as the answer to their flood problems. They considered structural measures to be essential.

The major improvements desired may be summarized as under:

- A very considerable reduction in the incidence of flooding and the amount of flood damages.
- The provision of recreational opportunity.
- Improvement of water quality in the lower reaches of Ellicott Creek.

A concomitant of these desired improvements is that they be accomplished with the minimum adverse environmental effect.

10 - ERIE-NIAGARA BASIN PLAN

The Erie-Niagara Basin Regional Water Resources Planning Board was established in 1963, to prepare a comprehensive plan for the development and management of the water and related land resources of the Erie-Niagara Basin. The New York State Conservation Department, Division of Water Resources, provided staff to the Board. The study covered streams entering Lake Erie and Niagara River through or

abutting Erie County. The Ellicott Creek watershed is in the northern portion of the basin and includes about 6 percent of the total basin land area.

In 1970 the Board published its Basin Plan, including the formulation of the alternatives available with respect to municipal and industrial water supply, water quality management, irrigated-agriculture, water-oriented recreation, fish and wildlife enhancement, flood plain management and other functions and the integration of these alternatives into a coordinated development program for the periods 1970 to 2020, with emphasis on the early action (1970 to 1980) phase of the program.

11 - PLAN FORMULATION

11.1 - General

The location most affected by flooding of Ellicott Creek is Amherst. Unfortunately, this is also the town in which the major thrust of development is to occur, notably the Urban Development Corporations's Audubon development and the new State University of New York at Buffalo (SUNYAB) campus. Both are in the floodplain and the former is very considerably affected by flooding. SUNYAB has followed a very wise layout policy to minimise flood damage. Structural flood control measures in Amherst are therefore necessary. Elsewhere, zoning and flood proofing offer scope for considerable reduction of future and present flood damages.

11.2 - Criteria

The formulation and evaluation of alternative flood-control plans requires, of necessity, to be within the framework of common criteria. Certain criteria are Federal and State Standards, others are unique to the problem. The more important criteria are listed below:

- Protection is to be provided against the 100-year flood (the Intermediate Regional Flood)
- Schemes must satisfy the objectives of National Economic Development, Environmental Quality, Social Wellbeing, and Regional Development.
- The potential for recreation must be considered
- Schemes must be economically attractive
- Comparative evaluations must include both tangible and intangible benefits.
- Minimum damage to Basin resources

11.3 - Type Schemes

While the alternative possibilities for flood control are many, the range of schemes is fairly narrow. The range

considered has been:

-Channelization of the creek to improve flow capability
-Floodwater diversion, to protect Ellicott Creek's bankside beauty
-Levees and floodwalls as an alternative to channelization
-Reservoirs to hold basin run-off for later, controlled release
-Public acquisition of the flood plain
-Floodplain management and flood proofing

Within this range, a total of 31 different flood control schemes have been considered. A matrix of the 31 considered proposals is shown following page 20.

Four channelization schemes have been examined; three were discarded in favor of the one involving major channel improvements.

Three floodwater diversion schemes have been examined; two were rejected.

Levees and floodwalls in three reaches of the creek have been examined. On grounds of cost and aesthetic undesirableness the type solution was rejected.

Eleven different dam sites have been examined for their flood-water retention potential, either as single units or in some economically optimum combination. Only the Sandridge and Bowmansville-Pavement Road sites merited detailed consideration.

Public acquisition is considered neither necessary nor desirable.

Locations near Buffalo Airport and in Bowmansville are considered very suitable for the application of floodplain management principles.

12. - SELECTED SCHEMES (A) MAJOR CHANNEL IMPROVEMENT

12.1 - Main Features

Plate 4 illustrates the location and extent of this proposed

flood-control scheme. The effect of the scheme is to protect Amherst and Tonawanda from the 100-year flood.

This scheme proposes major realignments of the creek in order to eliminate constricting meanders. Additionally, the creek is widened to improve flow capacity. The improved alignment facilitates the provision of small roadside/creekside park areas.

A major disbenefit is the environmental damage done to the existing creek-banks in order to provide a wider creek. It also does not produce any water oriented recreation and it does nothing to improve water quality in the creek. Environmental damage can be mitigated by revegetation of the new banks.

12.2 - Details

12.2.1. - General

The considered plan provides about seven miles of channel enlargement and realignment, mostly in the town of Amherst, extending from the confluence of Tonawanda Creek with the Ellicott Creek diversion channel, to the Sheridan Drive bridge. The plan is designed to eliminate most damages in this length expected from a flood having a recurrence interval of once in 100 years. One highway bridge and two foot bridges need replacing. Three other highway bridges require modification to conform with the improved channel. Local storm drainage systems discharge into the channel at about 50 points. New headwalls and flap gates are required on some of these lines to prevent back-up during high creek flows. In the diversion channel two electricity transmission towers will need relocation. The more important features of the considered plan are discussed in the following paragraphs.

12.2.2.- Channel

The design bottom width of the improved trapezoidal channel varies from 80 feet to 110 feet, except near the upstream end of the project where two 800-foot-long high velocity sections are to be constructed. At one high velocity section the channel tapers to a 60-foot bottom width, and at the other it tapers to a 40-foot bottom width. Their purpose is to raise both the water surface and channel bottom to the elevations

in the unimproved reach upstream. At both these sections the channel sides and bottom are to be riprapped. The main channel is also to be riprapped where necessary to protect against erosive velocities.

12.2.3 - Ellicott Creek Park Diversion Channel

The existing diversion channel connecting Ellicott Creek with Tonawanda Creek at the downstream end of the considered plan is to be enlarged to carry the greater flows that occur with the upstream channel enlargement. The diversion channel was constructed in 1965 by the county to divert high flows on Ellicott Creek to Tonawanda Creek. Under normal conditions most of the diversion channel is dry. It is grass lined except for a paved section used for parking in Ellicott Creek Park. In the proposed scheme the diversion channel is to be widened to a maximum width of 230 feet, which is about double the present width. Initial diversion from Ellicott Creek will occur at about the two-year flood frequency under both existing and improved conditions. At the Tonawanda Creek end of the diversion channel, three 106" x 116" Lo-Hed concrete pipes require to be added to an existing culvert under Tonawanda Creek Road, to pass the design flow.

12.2.4 - Bridges

The bridge at Sweet Home Road cannot be economically modified to pass design flows and needs to be replaced. Erie County authorities are currently effecting this replacement as part of the University of Buffalo grand design. Bridges at Niagara Falls Boulevard, Maple Road and North Forest Road need to be modified. In most instances, sheet piling will be driven around the abutments for protection after the existing opening is deepened. The Millersport Highway bridge will probably be removed and not replaced during construction of the proposed new SUNYAB campus on the edge of the flood plain. Possible changes to this bridge have been excluded in the considered plan. The Audubon Golf Course has two foot bridges that cross Ellicott Creek. These bridges will be replaced or modified under improved conditions.

MATRIX OF CONSIDERED PROPOSALS ON ELLICOTT CREEK

Study Objective	Channelization		RESERVOIRS									
	Reaches 0, 1, 3	Reaches 0-4	Sandridge	Sandridge & minor channel improvement	Upstream	Control Dams w/Channel Improvement	Underground	BOWMANSVILLE	BOWMANSVILLE PLUS PAVEMENT ROAD DAM	BOWMANSVILLE WITH TERTIARY TREATMENT	Channelization	Levees and Floodwalls
Proposal National Economic Development	2 Considerable urban flood damage would be reduced. (50yr. protection) B/C 2.60 +	3 Major amount of urban flood damage would be reduced. (100yr. protection) B/C 1.32 +	9 Considerable urban flood damage would be reduced Recreation and fish and wildlife benefits B/C 1.05 +	13 Major amount of urban flood damage would be reduced. Recreation and fish and wildlife benefits. More costly than Plan 9 B/C 1.01 +	10, 11, 12 Similar to Plan 9 but smaller in size and cost but single purpose flood control B/C Not developed	26 Similar to Plan 13 B/C 0.83 0	28 Major urban flood damage reduced recreation potential B/C 0.51 −	29 SIMILAR TO PLAN 28 B/C 1.03 +	30 SIMILAR TO PLAN 29 B/C 0.92 +	31 SIMILAR TO PLAN 29 B/C 1.05 +	4, 5 Small localized amount of urban damage would be reduced B/C 4 = 0.34 B/C 5 = 0.20 −	6, 7, 8 Protection the same as Plans 3, 4, and 5 B/C 6 = L Plan 3 B/C 7 = L 0.34 B/C 8 = L 0.20 − −
Environmental Quality	Adverse effect on natural environment. Creek length reduced, low protection − −	Same as plan 2 except greater protection − −	Adverse effect on natural and man-made environment. Stream flow augmentation to reduce stagnation & water quality [illegible] −	Same as plan 9 except creek length reduced − − −	Similar to Plan 9 but less impact −	Environmentally Poor − −	Little adverse effect on environment 0	ENVIRONMENTALLY POOR − − −	SIMILAR TO PLAN 29 BUT LESS ADVERSE IMPACT − −	SIMILAR TO PLAN 30 − −	Similar to Plan 2 but less impact −	More adverse effect on environment than channelization − − −
Social Well Being	About 3,000 acres protected and create a better sense of security for residents of about 1,100 homes +	Same as Plan 2 except more than 6,000 acres and about 1,300 homes would be protected plus some businesses and essential services +	Protection ~ 6,000 acres, 1,500 homes 33 square miles of drainage area controlled and some businesses and essential services. Many people would be relocated. 0	Same as Plan 9 except greater protection +	Similar to Plan 9 but less impact 0	Similar to Plan 13 0	Similar to Plan 13 0	SIMILAR TO PLAN 13 0	SIMILAR TO PLAN 13 0	SIMILAR TO PLAN 13 0	Similar to Plan 2 but much less protection +	Similar to Plan 3 +
Regional Development	Property exchanges would be easier and owner more apt to make improvements small business could be attracted to area +	Same as Plan 2 +	Same as Plan 2 plus beneficial effect to municipal water supply and stream flow, job opportunities + +	Same as Plan 9 + +	Similar to Plan 9 but no beneficial effect to municipal water or stream flow 0	Similar to Plan 13 +	Same as Plan 2 plus stream flow augmented +	SIMILAR TO PLAN 2 +	SIMILAR TO PLAN 13 + +	SIMILAR TO PLAN 2 +	Similar to Plan 2 but much less impact +	Same as Plan 2 +
Total Effect (−, 0, +)	Plan is viable [illegible] environment [illegible] +	Same as Plan 2 except protection is greater +	Plan provides a multiplicity of benefits − but would adverse effect social well being and environment +	Same effects as Plan 9 w/added protection +	Plan probably not viable. −	Not as acceptable as Plans 9 or 13 −	Further study necessary 0	NOT AS ACCEPTABLE AS PLANS 9 OR 13 −	NOT AS ACCEPTABLE AS PLAN 13 0	PLAN PROBABLY NOT VIABLE −	Plan is not viable, adverse effect on environment −	Plan is not viable very offensive to people environment −

MATRIX OF CONSIDERED PROPOSALS ON ELLICOTT CREEK

Study Objective	Parallel Lakes Reach 1-4	Diversion Channels: Marine Park to Tonawanda Creek	Diversion Channels: Amherst	Flood Plain Management Reach 1-4	Flood Proofing Reaches 2 & 3 Williamsville	Evacuation	Public Acquisition	Flood Plain Management: Reaches 8, 9	Flood Plain Management: Reaches 12 Algen - Crittenden	Flood Proofing	NO CORPS PARTICIPATION
Proposal National Economic Development	24 Cost high compared to Plan 3 B/C 0.94 —	25 Considerable flood damage would be reduced. Recreational benefits. B/C 1.09 +	26 Major amount of flood damage would be reduced. Recreational opportunities B/C 1.15 +	14 Less impact than Plans 15, 16 0	17, 18 Same effects as Plan 19 B/C 17=1.89+ B/C 18=0.41 —	20, 21, 22 Cost high in light of possible benefits B/C N/A —	23 Protection can be provided cheaper with structural measures B/C 0.25 —	12 Minor reduction in flood damage No federal participation B/C N/A +	13 Minor reduction in flood damage Some recreational benefit possible No federal participation B/C N/A +	15 Reduction in flood damage Cost would be personal B/C 1.35 +	1 NO FLOOD DAMAGE REDUCTION B/C N/A 0
Environmental Quality	Environmentally Poor —	Adverse effect on natural environment some enhancement to man made environment and open space. Water quality problem —	Adverse effect on natural and man made environment open space use would be improved. —	Same as Plans 15 and 16 0	Same as 19 —	Environmentally Good +	Environmentally Good +	No adverse effect on environment 0	Same as plan 15 0	Some adverse effect on man made environment. —	LITTLE EFFECT ON NATURAL ENVIRONMENT 0
Social Well Being	Similar to Plan 3 +	Houses, lands and businesses protected. Flooding still possible resulting in insecurity —	Same as Plan 25 except dependable flood control +	Similar to Plans 15 and 16 but greater +	Same as 19 +	Portable items would be saved from damage +	Residences would be saved from damage +	LESS: 4,000 acres of land, a few businesses and about 1,000 homes could avoid flood damage Create a better sense of security and well being +	Same as Plan 15 +	Properties protected and create a sense of security and well being +	PROPERTIES UNPROTECTED WILL CREATE A CONTINUED SENSE OF INSECURITY —
Regional Development	A few jobs created +	Economic stability improved a few jobs created +	Same as Plan 25 +	Constrains local development —	Same as 19 —	Adverse effect — —	Adverse effect — —	Constrains local development —	Constrains local development —	Property exchange might be difficult utilities and transportation networks still subject to flooding —	ECONOMIC STABILITY UNIMPEDED —
Total Effect (−, 0, +)	Environmentally unacceptable as compared to Plan 3 that could some later and cheaper 0	A viable plan, little change to Ellicott Creek . 0	More viable than Plan 25 +	Plan not viable, land use plan and development to far advanced to implement 0	Some structural solutions are necessary for Plan 17 Plan 18 not viable 17=0 18=—	Probably socially unacceptable —	Probably unacceptable by public over investment in public lands —	Constrains local development no adverse effect on environment +	Same as Plan 15 +	Personal implementation necessary 0	[illegible] —

12.2.5 - Roadside Parks

The realignment of the creek yields pockets of open space adjacent to Forest Road which are developed into roadside parks. A total of seven parks is provided, the largest of which is seven acres, and the smallest of which is half an acre. In these pocket-parks there will be picnic tables, shade areas, the opportunity for children to fish, scamper areas for small children and the like. An illustration of this is given in the succeeding plate.

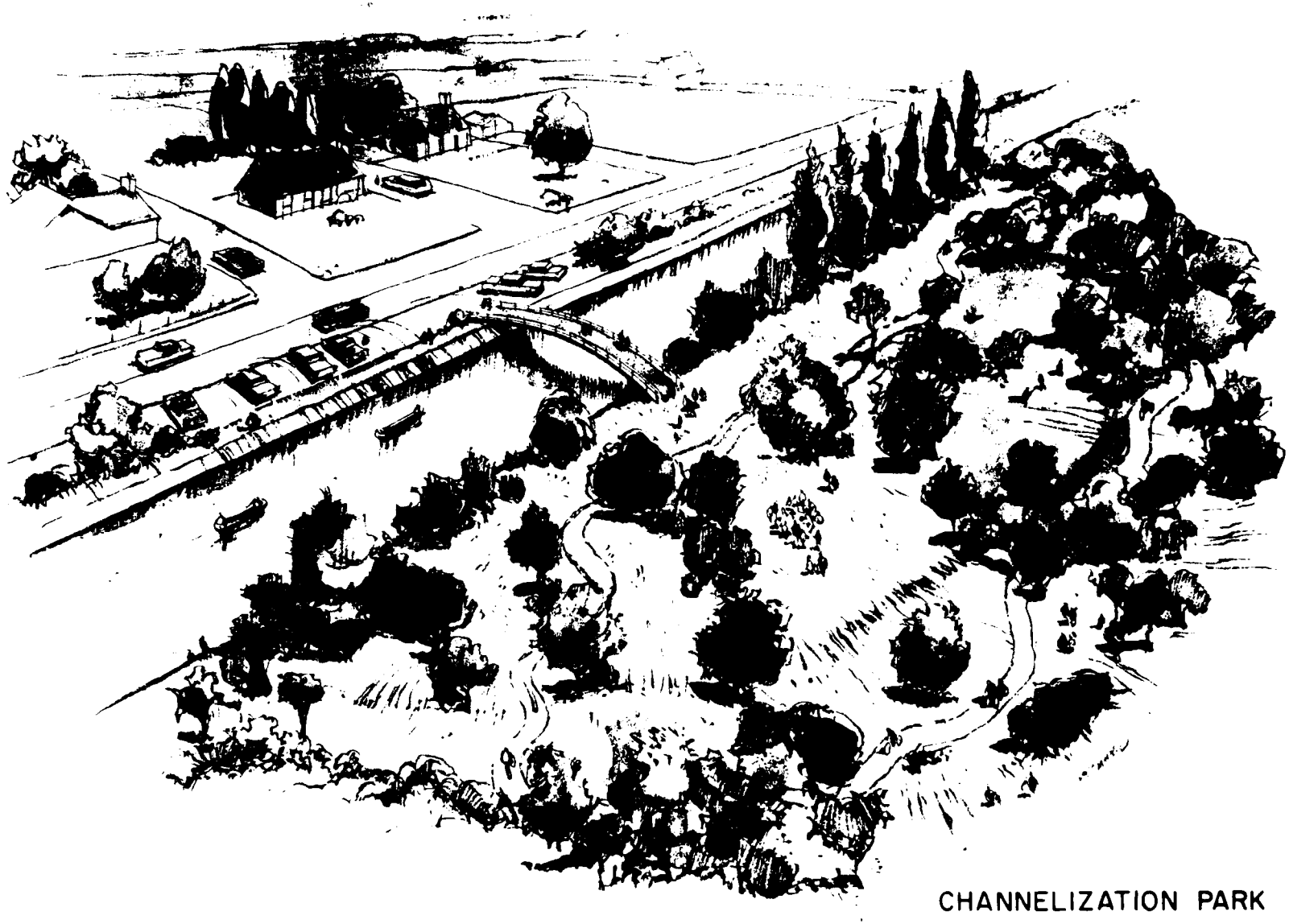
12.2.6 - Water Quality

A very desirable attribute of any flood control scheme would be the capability of improving the quality of the water in Ellicott Creek in the generally low flow months of July, August and September of each year. The major channelization scheme does not possess this capability. In these months the waters of Ellicott Creek are both visually and olfactorilly thoroughly objectionable.

A major source of liquid (and sometimes not so liquid) input into the creek is the Sewage Treatment Plant No. 1 in Amherst, with a discharge of some 6-8 millions gallons per day. The plant provides secondary treatment only. It is recommended tertiary treatment be provided to the effluent before discharge. Since the discharge point is at the upstream end of the channelization measure (see Plate 4), tertiary treatment would not only make a very considerable benefit to water quality, but also make this part of Amherst a more pleasant place in which to live in the summer.

12.3 - Estimate of Cost

A summary estimate of first costs for the proposed major channel improvement is shown in Table 12.1. It is assumed that two years will be required to complete construction. Total investment includes interest during construction for one half the construction period.



CHANNELIZATION PARK

TABLE 12.1 - MAJOR CHANNEL IMPROVEMENTS SCHEME: SUMMARY ESTIMATE

ITEM	QUANTITY	UNIT	UNIT COST	AMOUNT FEDERAL	AMOUNT NON-FEDERAL
CHANNELIZATION					
LANDS AND DAMAGES					$861,000
RELOCATIONS				$272,000	310,000
CHANNELS				4,146,000	
ENGINEERING AND DESIGN				353,000	62,000
SUPERVISION AND ADMINISTRATION				208,000	43,000
TOTAL FIRST COSTS				4,979,000	1,276,000
RECREATION FACILITIES					
LANDS AND DAMAGES				54,500	54,500
PICNIC AREAS				138,850	138,850
CONTINGENCIES, ENGINEERING, SUPERVISION OF CONSTRUCTION, ADMINISTRATION etc.				69,650	69,650
TOTAL FIRST COST				$5,242,000	$1,539,000

12.4 - Annual Cost

Annual costs include maintenance, 5⅛ percent interest on investment and amortization of investment over an assumed 100-year project life. Non-Federal maintenance includes repairs and maintenance of structures and channels and parks. Federal maintenance in limited to periodic inspections. Table 12.2 shows the computations for annual costs, and Table 12.3 Average Annual Costs and Benefits.

13 - DIVERSION CHANNEL

13.1 - Main Features

Plate 5 illustrates the location and extent of this proposed scheme. The effect of the scheme is to protect Amherst and Tonawanda from the 100-year flood.

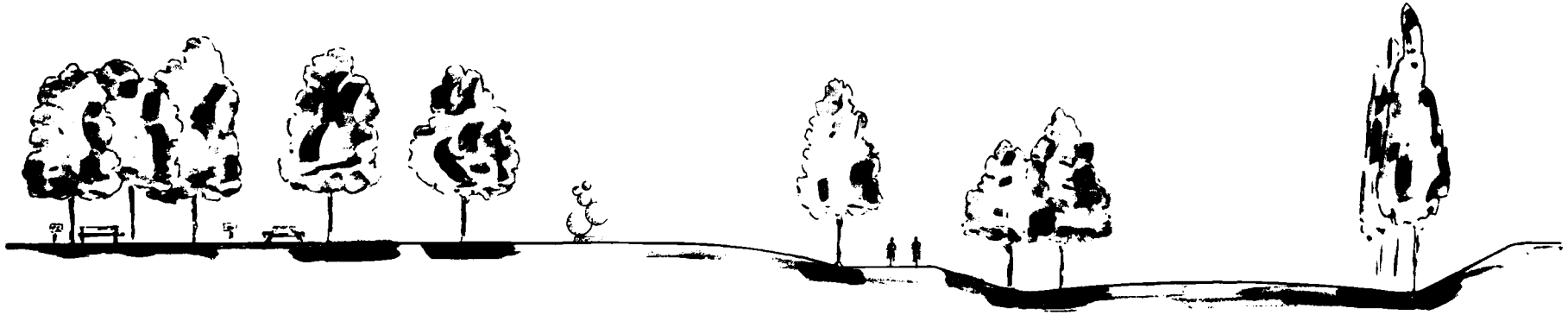
The major component of the scheme is a diversion channel in Amherst, through SUNYAB and UDC property, to carry flows that exceed the creek s existing capacity. In conjunction with the diversion channel, two reaches of the creek are widened. A strip park alongside the diversion channel is provided.

The merits of the scheme lie in flood-protection, the provision of recreational areas, a bikeway, picnic areas, and the fact that very little environmental damage is done to the natural beauty of the creek's banks. Drawbacks to the scheme are the very little water oriented recreation is provided and that water quality in the creek is not improved.

13.2 - Details

13.2.1 - General

The proposed scheme provides about 3.4 miles of diversion channel in the town of Amherst, together with some 8,000 feet of channel improvement upstream of the diversion point, and a further 5,000 feet of channel improvement downstream of the confluence of the diversion channel and Ellicott Creek. The scheme is designed to eliminate flood damages



ELLICOTT CREEK DIVERSION CHANNEL

TABLE 12.2 MAJOR CHANNEL IMPROVEMENTS ANNUAL COSTS

ITEM	FEDERAL	NON-FEDERAL
Interest (5½ percent)	$304,200	$ 89,300
Amortization	1,400	400
Maintenance	700	25,300
TOTAL	$306,300	$115,000

TABLE 12.3 MAJOR CHANNEL IMPROVEMENTS

ITEM	COST
Average Annual Benefits	$858,000
Average Annual Costs	421,300
Net Benefit	436,700
Benefit Cost Ratio	2.04

from floods having a frequency of up to the 100-year flood.

Three highway bridges require modification and, making due allowance for proposed UDC roads in their Audubon development, eleven crossings are needed. Three storm drains from the Audubon development cross the diversion channel. More important features of the scheme are recorded below.

13.2.2 - Channel Improvement

Between Sheridan Drive and Maple Road the existing channel section is improved by increasing its width to 120 feet. Two 800 feet long high-velocity sections require to be constructed in this stretch. At one high velocity section the channel tapers to a 60-foot bottom width and at the other it tapers to a 40-foot bottom width. Their purpose is to raise both the channel bottom and water surface to the elevation of the unimproved reach upstream.

The diversion channel rejoins Ellicott Creek some 2000 feet downstream of Sweet Home Road. Between this point and the Niagara Falls Boulevard Bridge the existing channel has minor realignment and the flow capacity is improved.

13.2.3 - Diversion Channel

The diversion channel is approximately 3.4 miles long and extends from just below Maple Road to a point 2000 feet downstream of Sweet Home Road. It is roughly trapezoidal and has a bottom width which varies by design from 100 feet to 120 feet along its length. Its section is so selected as to accommodate a bikeway. For approximately the first half of it's length it is south of Ellicott Creek, for the remainder of its length it is on the north side.

13.2.4 - Ellicott Creek Park Diversion Channel

The changes necessary to the existing diversion channel in Ellicott Creek Park are identical to those described in paragraph 12.2.3. They are required to cope with the increased flows resulting from the upstream improvements.

13.2.5 - Bridges

Modifications are required to the bridges on Niagara Falls Boulevard, Maple and North Forest Roads. The bridge at Sweet Home Road requires replacement, but Erie County is replacing and relocating this bridge as part of its contribution to the expansion of the University of Buffalo in Amherst. Eleven new bridges are required; three at State cost, two at Erie County cost and six at UDC cost.

The Millersport Highway Bridge will probably be removed and not replaced in the process of the SUNYAB development. Costs associated with this are a SUNYAB account.

13.2.6 - Recreational Facilities

Recreational Facilities are provided, generally, only alongside that part of the diversion channel which lies on the north side of Ellicott Creek. A 150-foot width of landscaped area is provided in this 2 mile length. Landscaping will consist principally of grassing and the planting of trees. Rest areas and picnic tables are to be provided. Nature trails are to be installed.

The portion of the diversion channel lying south of Ellicott Creek is in the SUNYAB proposed playing fields area. No additional treatment here is contemplated.

A bikeway is provided in the diversion channel along its length to the proposed Lockport Expressway, and thereafter alongside the diversion channel. A small boating area is provided in the diversion channel over the last 5,000 feet of its length. If the tertiary treatment plant is installed in Amherst, then some swimming will also be possible in this general boating area.

13.2.7 - Water Quality

This scheme has the same lack of improvement to water quality defect as the channelization scheme. Tertiary treatment at Amherst's Sewage Treatment Plant No. 1 is therefore recommended, as in the previously described scheme.

13.3 - Estimate of Cost

A summary estimate of first costs for the proposed diversion channel scheme is shown in Table 13.1. It is considered that only one year is needed to complete construction, except for the new bridges, which are assumed to take two years to complete. Interest during construction is charged on the new-bridge program.

13.4 - Annual Costs

Annual costs include maintenance, 5-1/2 percent interest on investment and amortization of investment, over an assumed 100-year project life. Non-Federal maintenance includes repairs and maintenance of structures and channels. Federal maintenance is limited to periodic inspections. Table 13.2 shows the annual costs and Table 13.3 average annual costs and benefits.

14 - SANDRIDGE RESERVOIR WITH MINOR CHANNEL IMPROVEMENTS

14.1 - Main Features

Plate 7 shows the locations of the two components of this scheme in relation to each other and also to the Basin. Plate 8 illustrates details of the dam area and Plate 6 details of the minor channel improvements. The illustration on the next page depicts a concept of the reservoir.

A dam at Alden would impound a multi-purpose reservoir of surface area 2150 acres, of which 425 acres would be a fish and wildlife conservation area.

A drawback of the reservoir location is that it impounds the run-off from only a small portion of the whole basin, just 33 square miles. It's effect on flood reduction at the other end of the basin is consequently not as great as is required. Some channelization in the Amherst area is therefore necessary. Since the channelization is not as extensive as the first channelization described, it is referred to as minor channel improvements. The improvements

TABLE 13.1 - Diversion Channel Scheme Summary Estimate

ITEM	FEDERAL	NON-FEDERAL
DIVERSION CHANNEL		
LANDS AND DAMAGES		1,233,000
RELOCATIONS	272,000	4,490,000
CHANNELS (inc. Ellicott Creek Pk.)	2,438,000	
ENERGY DISSIPATOR	144,000	
STORM DRAINS CROSSINGS	105,000	
CREEK/CHANNEL CROSSING	126,000	
DRAINAGE FILTERS	338,000	
RECREATION FACILITIES	347,000	347,000
ENGINEERING AND DESIGN	320,000	312,000
SUPERVISION AND ADMINISTRATION	205,000	221,000
TOTAL FIRST COSTS	4,295,000	6,603,000

(1) Exclusive of $175,000 expended on re-study of alternatives

TABLE 13.2 - Diversion Channel Annual Costs

ITEM	AMOUNT FEDERAL	NON-FEDERAL
INTEREST (5 - ½%)	236,200	378,300
AMORTIZATION	1,100	1,800
OPERATION AND MAINTENANCE	700	25,300
	238,000	405,400

TABLE 13.3 - Diversion Channel

AVERAGE ANNUAL BENEFITS	1,077,000
AVERAGE ANNUAL COSTS	643,400
NET BENEFIT	433,600
BENEFIT COST RATIO	1.67

consist of widening and slightly realigning two reaches of the creek, each about 1-1/2 miles long. These improvements provide greater flow capability and the opportunity to construct some roadside parks.

The major adverse effect of the scheme is that it would displace 82 families in the reservoir area and inundate prime agricultural land. But it would also possess many advantages.

14.2 - Details

14.2.1 - General

The scheme is designed to drastically reduce damages expected from a flood having a recurrance interval of 100 years. It's main effect is in the Amherst area where the minor channel improvements are affected These improvements do not diminish flood damages upstream of Williamsville; the Sandridge dam effects the diminution of damages between Williamsville and the dam site.

The reservoir would have a surface area of 2150 acres and a maximum depth of some 45 feet. It would inundate part of Sumner and Reynolds Roads and County Line Road. A raised Harlow Road would separate the fish and wildlife pool from the main conservation pool.

The channel alignment in Amherst would affect 50 discharge lines from local storm drainage and modifications are necessary. Four highway bridges would require foundation protection. In the Ellicott Creek Park two transmission towers would need relocating as a result of diversion channel widening.

14.2.2 - Sandridge Dam

The dam would be an earthfill dam located some 1500 feet east of Alden in Erie County. It would be about 8200 feet long and have a maximum height of 65 feet above foundation elevation. The spillway would be a gateless type and would be on the south side against the abutment.

SANDRIDGE LAKE

The top width of the dam would be 20 feet and used as a road. An overlook area would be provided on this road. At top water elevation there would be five foot height of freeboard.

14.2.3 - Sandridge Reservoir

The reservoir would be just over three miles long with a maximum depth of some 45 feet. In addition to a fish and wildlife pool of approximately 425 acres surface area and an average depth of 2 feet, the reservoir would provide flood protection, water oriented recreation such as boating, picnicking, swimming and camping, the capacity to improve flows in Ellicott Creek in the low flow months, and also the potential for water supply to certain small towrs and villages in the general area.

14.2.4 - Downstream Minor Channel Improvements

The downstream improved channel section extends from the confluence with the Ellicott Creek Park diversion channel to the Sweet Home Road bridge. The Creek channel bottom width over this length would be widened to 90 feet. The upstream improved channel would extend from 3000 feet upstream of the existing Millersport bridge to Maple Road. This stretch requires a 120 foot bottom width.

14.2.5 - Ellicott Creek Park Diversion Channel

This channel would be widened to a bottom width of 200 feet and two 106" x 166" Lo-Hed concrete pipes would be required under Tonawanda Creek Road, in addition to the existing pipe, to pass the design flood.

14.2.6 - Bridges

The reduced flows of the design flood require no replacement of any bridges but certain modifications are necessary. In the main the protection consists of sheet-piles driven around abutments to protect them. Modifications are needed to three bridges, at Niagara Falls Boulevard, Maple Road and North Forest Road.

14.2.7 - Roadside Parks

A total of seven roadside parks are provided in Amherst in locations where there is adequate space between the realigned creek and its old course. The largest of these is seven acres and the smallest half an acre. In concept they are identical to those provided in major channel improvements.

14.2.8 - Water Quality

The months of July, August, and September see very low flows in Ellicott Creek. These low flows permit sewage treatment plant effluent concentrations in the creek to exceed the point of acceptability. Algae growth flourishes and nauseous odors are generated. The design capacity of the Sandridge Reservoir allows for the release of 16 million gallons per day, over this period, to increase flows in the Creek and thus reduce undesirable concentration.

14.3 - Estimates of Cost

A summary of first costs for the proposed Sandridge reservoir and minor downstream channel improvements is given in Table 14.1. It is assumed that two years would be required to complete construction and so investment cost includes interest during construction for one year on all first costs except lands and damages.

14.4 - Annual Cost

Annual costs for the proposed investment are shown in Table 14.2. They include interest on the total investment at 5-1/2 percent, and amortization over an assumed 100 year project life at this constant rate of interest. Other annual costs are operation, maintenance costs and loss of production. Loss of production is an economic cost that reflects the difference between the assumed rate of return from agricultural production and the Federal interest rate. Table 14.3 presents annual costs and benefits.

TABLE 14.1 - SANDRIDGE RESERVOIR AND MINOR CHANNEL IMPROVEMENTS SCHEME SUMMARY ESTIMATE

ITEM	FEDERAL	AMOUNT	NON-FEDERAL
SANDRDIGE RESERVOIR			
LAND AND DAMAGES			3,588,000
RELOCATIONS	2,688,000		
RESERVOIR CLEARING	126,000		
DAM	4,115,000		
SPILLWAY AND LOW FLOW CONDUIT	6,047,000		
ENGINEERING AND DESIGN	2,206,000		
SUPERVISION AND ADMINISTRATION	1,194,000		
	16,376,000		
TOTAL FIRST COSTS (DAM, RESERVOIR & LANDS)		19,964,000	
RECREATION FACILITIES			
LANDS AND DAMAGES			747,500
PICNIC AREAS	950,000		
BEACHES	1,229,000		
BOAT LAUNCHING FACILITIES	194,500		
SANITATION FACILITIES	430,000		
WATER SUPPLY	395,000		

ITEM	FEDERAL	AMOUNT	NON-FEDERAL
RECREATION FACILITIES (cont'd)			
SIGNS	7,000		
ROADS	810,000		
PLAYGROUNDS	60,000		
HIKING	27,500		
ADMINISTRATION BUILDINGS	98,000		
CONTINGENCIES	1,050,500		
ENGINEERING AND DESIGN	368,000		
SUPERVISION AND ADMINISTRATION	368,000		
	5,987,500		
PRESENT WORTH OF EXPANSION COST		825,000	
TOTAL FIRST COST (RECREATION FACILITIES, WITH LANDS)		7,560,000	
FISH AND WILDLIFE CONSERVATION			
HARLOW ROAD CONTROL STRUCTURE	473,000		
BOAT LAUNCHING FOR FISHING	143,000		
ENGINEERING AND DESIGN	100,000		
SUPERVISION AND ADMINISTRATION	56,000		
TOTAL FIRST COST	772,000		
MINOR CHANNEL IMPROVEMENTS			
LAND AND DAMAGES			555,000
RELOCATIONS	194,000		215,000

ITEM	FEDERAL	AMOUNT	NON-FEDERAL
MINOR CHANNEL IMPROVEMENTS (cont'd)			
CHANNELS	1,722,000		
ENGINEERING AND DESIGN	189,000		73,000
SUPERVISION AND ADMINISTRATION	110,000		55,000
TOTAL FIRST COST	2,183,000		898,000
		$3,081,000	
RECREATION FACILITIES			
LAND AND DAMAGES	54,000		54,000
PICNIC AREAS	123,450		123,450
CONTINGENCIES	29,550		29,550
ENGINEERING AND DESIGN	15,500		15,500
SUPERVISION AND ADMINISTRATION	15,500		15,500
TOTAL FIRST COST	238,000		238,000
TOTAL PROJECT FIRST COST		$31,853,000	
INTEREST DURING CONSTRUCTION AT 5-1/2% (ON ALL COSTS EXCEPT LANDS & DAMAGES)		1,469,000	
TOTAL PROJECT INVESTMENT COST		$33,322,000	

TABLE 14.2 - SANDRIDGE RESERVOIR AND MINOR CHANNEL IMPROVEMENTS ANNUAL COSTS

ITEM	COST
SANDRIDGE DAM AND RESERVOIR	
TOTAL ANNUAL COST	1,279,800
SANDRIDGE RECREATION FACILITIES	
TOTAL ANNUAL COST	1,066,000
FISH AND WILDLIFE FACILITIES	
TOTAL ANNUAL COST	52,000
MINOR CHANNEL, RECREATION FACILITIES	
TOTAL ANNUAL COST	221,400
TOTAL ANNUAL COST FOR THE SCHEME	2,619,200
SAY	2,619,000

TABLE 14.3 - SANDRIDGE RESERVOIR AND MINOR CHANNEL IMPROVEMENTS

ITEM	COST
AVERAGE ANNUAL BENEFIT	2,745,000
AVERAGE ANNUAL COSTS	2,619,000
NET BENEFIT	126,000
BENEFIT COST RATIO	1.05

15 - BOWMANSVILLE LAKE

15.1 - Main Features

Plate 7 illustrates the scheme. Plate 10 illustrates the location in relation to landmarks, and on the next page is an illustration of the concept of the Bowmansville Lake.

Bowmansville Lake is a multi-use lake, supplying flood protection for the downstream areas of Williamsville and Amherst, and a large, conveniently located center for wateroriented recreation. The lake is contained within levees on the north, west and south sides, and gently rising terrain on the east.

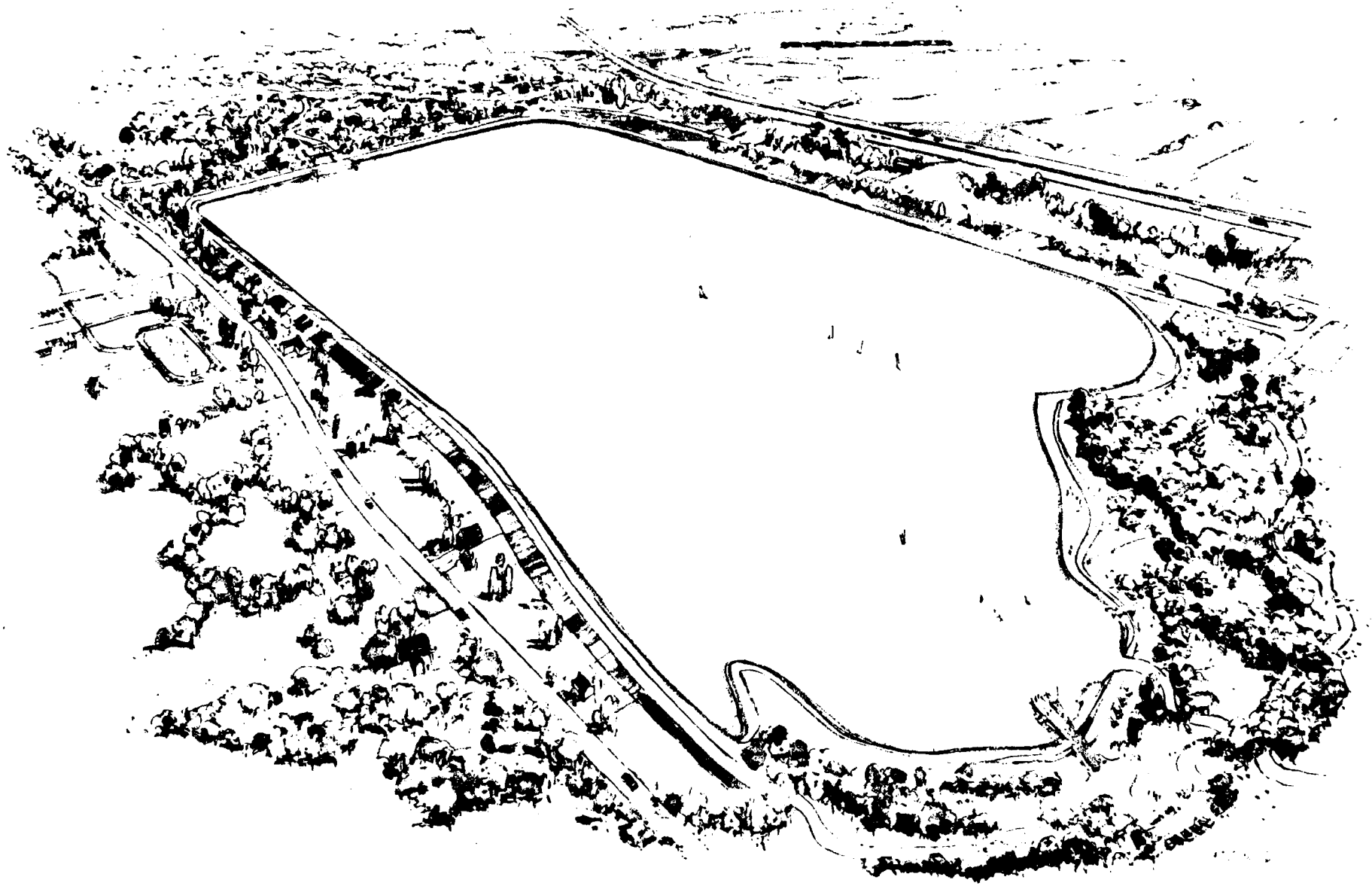
Major drawbacks to the proposal derive from environmental damage and disturbance, loss of gas wells and sites of archeological importance, the presence of unsightly dikes alongside major transport arteries, loss of tax base in Lancaster and the eviction of 53 families from their homes to facilitate implementation of the scheme.

However, the scheme has many advantages and deserves serious consideration.

15.2 - Details

15.2.1 - General

The scheme is designed to eliminate floods in Amherst and Williamsville that originated from a flood having a return period of 100 years, i.e. the Intermediate Regional Flood.



BOWMANSVILLE LAKE

This is achieved by impounding floodwaters from a drainage area of some 69 square miles and releasing water at a rate such that flow at the Williamsville gage downstream does not exceed 1000 cfs.

While flooding downstream of the airport runway is eliminated, unfortunately flooding between the runway and Bowmansville Lake is not. Previous studies have shown it is uneconomic to effect structural protection in this location.

Bowmansville Lake has a generally constant lake-level of elevation 720 feet, giving it a maximum depth of about 10 feet. Since the lake features prominently in the recreational facilities to be made available, this elevation produces the shallowed practical recreational pool depth. At elevation 720 feet, the lake has a surface area of about 1040 acres. At this lake elevation Stony Road is inundated in the length north of Peppermint Road and so are the houses fronting it.

15.2.2 - Bowmansville Lake

This lake is formed by constructing an uncontrolled concrete spillway 645 feet long across Ellicott Creek some 500 feet upstream of Harris Hill Road. Levees connect to the spillway as shown on Plate 11, forming an enclosure on 3 sides. The total length of levees or embankment is approximately 5.8 miles.

The top width of the embankment is 20 feet and provides a one-way road system around the lake. The spillway is crossed on a bridge. The top of the embankment has an elevation of 740 feet to provide retention capability for the floodwaters of the Intermediate Regional Flood. While the spillway is of concrete construction, the levees are of conventional earthfill construction with riprap protection.

The lake is approximately 2 miles long with a maximum depth of 10 feet; this point is near the spillway. The normal operating level of the lake is elevation 720 feet; at this elevation the reservoir has the capacity to accept the waters from the Intermediate Regional Flood.

15.2.3

The lake provides the focal point for recreation and land areas to the northeast and southeast are to be provided and developed for recreational pursuits. Boating will be a major recreational activity.

15.2.4 - Downstream Measures

No additional flood protection measures are foreseen for Williamsville and Amherst, downstream of the Airport. No measures are economically justified upstream of the airport.

15.2.5 - Roads and Bridges

Stony Road north of Pleasant View Drive is inundated by the Bowmanville Lake and houses are also lost. Existing bridges at Harris Hill and Pavement Roads will need modifications to accommodate the new conditions.

15.2.6 - Estimate of Cost

A summary of first costs and annual costs are provided in Tables 15.1 and 15.2. It is assumed 2 years will be required to execute the scheme and interest is charged accordingly. Amortization is over a 100-year period at 5½ percent. Interest on the total investment is also taken at 5½ percent.

TABLE 15.1 - Bowmansville Lake
Summary Estimate

ITEM	AMOUNT
BOWMANSVILLE LAKE	
Lands and Damages	$ 4,441,000
Relocations	560,000
Reservoir clearing	209,500
Dams and Levees	5,591,000
Spillway and low flow conduit	2,666,500
Engineering and Design	608,000
Supervision and administration	608,000
Total first costs (less lands)	10,243,000
Total first costs (inclusive lands)	14,684,000
Interest during construction at 5-1/2 percent	563,000
Investment cost for Bowmansville Lake	$15,247,000
RECREATION FACILITIES	
Lands and Damages	$ 716,000
Picnic areas	728,100
Boat launching facilities	79,400
Sanitation facilities	140,000
Water supply	86,000
Roads	197,400
Playgrounds	40,800
Administration buildings	60,000
Contingencies, engineering, supervision, administration, etc.	368,300
Total first cost	$ 2,416,000
Interest during construction at 5-1/2 percent	94,000
Investment cost	$2,510,000

TABLE 15.1 - Bowmansville Lake
Summary Estimate (cont'd)

ITEM	AMOUNT
SUMMARY	
Bowmansville Lake	15,247,000
Recreation Facilities	2,510,000
TOTAL	17,757,000

TABLE 15.2 - Average annual costs; Bowmansville Lake

ITEM	AMOUNT
ANNUAL COSTS	
Interest (5 ½ percent)	$ 976,400
Amortization (100 years)	4,600
Maintenance	180,000
TOTAL	$1,161,000

16 - Environmental Impact Assessment

16.1 - General

Any actions to effect control of the natural forces of flood-waters must undoubtedly have an effect on the environment. Some effects will be beneficial, some will be destructive. In the end, there is a trade-off between the positive and negative aspects. While in some cases it is possible to commercially quantify the effects, in many cases only a subjective conclusion can be made of effects.

In the succeeding paragraphs the beneficial and adverse effects of the three measures being examined are summarized.

Major Channel Improvements

16.2 - Beneficial Effects

(1) Achievement of flood control.

(2) Provision of spot parks through Amherst, with landscaped facilities for picnicking, and leisure recreation.

16.3 - Adverse Effects

(1) Probable long-term destruction of wildlife habitat by removal of riparian vegetation.

(2) Destruction of littoral zone, including nearly all forms of life found there.

(3) Destruction of nearly all fish life in the channelized sections.

(4) Loss of land of creekside dwellers.

(5) Loss of trees and some picnic facilities in Ellicott Creek Park, though these can be replaced.
The plan affords no method of maintaining reasonable flow at all times of the year. It supplies flood control, at the price of virtually destroying 6.5 miles of the creek. This seems the least desirable of the three alternatives.

Diversion Channel

16.4 - Beneficial Effects

(1) Provision of flood control.

(2) Addition of a scenic strip-park through Amherst, with facilities for picnicking, cycling, and some boating.

(3) Retention of Ellicott Creek in its natural state. The existing natural state can subsequently be improved through up-grading of sewage treatment along the stream.

If one wishes to preserve Ellicott Creek in as natural a state as possible, still achieving the goal of flood control, this is a viable alternative.

16.5 - Adverse Effects

Through the portions of the creek to be channelized, the adverse effects will be the same as those mentioned in paragraph 15.3. Along the diversion channel proper, the impact will be similar to that of building a road through a wooded and bushy area, with attendant loss of private and public property, and destruction of wildlife habitat. Precautions will have to be taken to ensure proper drainage of the upper reaches and sufficient depth in the lower (backwater) reaches.

Sandridge Dam, Reservoir and Minor Channel Improvement

16.6 - Beneficial Effects

(1) Provision of flood control in the Ellicott Creek basin.

(2) Provision of low -flow augmentation in the creek. This is an important by-product of the dam.

(3) Provision of a large site for water-based recreation. This is perhaps a less-clearly advantageous result, but of importance to many.

(4) Provision of a 425 acre fish and wildlife conservation area.

The most important benefits in this plan are the provisions of low-flow augmentation, and a multiple-use body of water; flood control is obtainable by other methods. The positive effects make the proposal worthy of consideration in spite of the scheme's drawbacks.

16.7 - Adverse Effects

16.7.1 - In reservoir area

(1) Removal of families, with the social problems involved in such an action. This is the most severe environmental effect of the scheme.

(2) Inundation of homes, forest, and cropland. A serious effect, but softened somewhat by the evidence that the area will be lost to agriculture whether Sandridge be built or not.

(3) Loss of wildlife habitat and attendant hunting possibilities. The habitat is a loss. The hunting possibilities seem less of a loss, since much of the land is posted.

(4) Loss of natural resources, such as gas wells and fossil beds. The gas wells are apparently of low yeild, and it is possible that measures can be taken to preserve the fossil beds. However, should the proposal be implemented as planned, they will be lost.

(5) Loss of roads. The reservoir will cut off four roads and has an effect on traffic circulation.

16.7.2 - In channelized sections downstream

(1) Probable long term destruction of wildlife habitat by removal of riparian vegetation.

(2) Destruction of littoral zone, including nearly all forms of life found there.

(3) Destruction of nearly all fish life in channelized sections.

(4) Loss of land of creekside dwellers.

(5) Loss of trees and some recreational facilities in Ellicott Creek Park.

BOWMANSVILLE LAKE

16.8 - Beneficial Effects

(1) Provision of flood control in the Ellicott Creek basin in the Williamsville - Amherst area.

(2) Provision of a large site for water based recreation, in an area which is conveniently close to centers of residential population.

16.9 - Adverse Effects

(1) As in the case of the Sandridge alternative, the most serious drawback of the scheme lies in the necessity of moving families from their homes. Fifty three residences must be acquired to implement this scheme.

(i) Inundation of forests and cropland. The loss of cropland will have a heavy impact on the lives of local farmers.

(ii) Loss of wildlife habitat. This loss would probably be less extensive than that caused by the Sandridge dam and reservoir, but it must be regarded as a negative feature of the proposal.

(iii) Loss of gas wells and sites of archeological importance. The latter, especially, is a serious drawback.

(iv) Inundation (permanent or temporary) of roads and utility lines. This should not prove to be of great consequence in the life of the local populace.

(v) Presence of unsightly dikes along Harris Hill Road, Genesee Street and Pleasant View Road.

(vi) Loss to the tax-role of Lancaster of large income from the quarry operators.

(VII) Possible anxiety caused to the citizens east of Bowmansville at having to live in close proximity to an earthen dike. Some may feel threatened by potential flood waters being contained only yards from their homes.

17 - FLOOD PLAIN MANAGEMENT

17.1 - General

A feature of the three flood-control schemes previously described has been the very considerably flood damage reduction they induce in Amherst and Tonawanda, and the very considerably less impact they have in places like Williamsville and Bowmansville. Certainly the channelization schemes have no effect on areas upstream of the measures, and the Sandridge dam diminishes average annual damages upstream of Sheridan Drive, to the Stony Road limit, from $22,360 to $6,520, under the conditions of development and price levels obtaining when the damage surveys were done in 1969.

Structural measures have been examined for the Williamsville and Bowmansville areas but have shown not to justify their investment cost. Consideration has therefore been given to Flood Plain Management as a means of preventing large flood damages in the future.

17.2 - Areas of Application

It is to be appreciated that major flooding in the basin

occurs downstream of Stony Road only. Plates 2 and 3 illustrate the flood plain and the limits of the Intermediate Regional Flood downstream of Stony Road. Since any of the three aforementioned structural proposals essentially resolves the flood problem in Amherst only, consideration has been given to the two other areas of major flooding shown on Plate 3. These areas are between the Buffalo Airport runway and Transit Road, and Harris Hill Road, and Stony Road.

A study of the 1972 aerial photography of these areas shows that both are still largely undeveloped, with large open spaces, though urbanization has reached the 100-year flood plain in the airport runway area. They are thus prime areas for the application of Flood Plain Management principles.

17.3 - Recommended Action

It is recommended that Flood Plain Management be a commitment required from the local governments with jurisdiction over any portion of the length of Ellicott Creek. In Amherst and Williamsville the width zoned for flood plain management will be very narrow. For Bowmansville and Williamsville the zones will obviously be wide; but then, there is no extensive land use in the flood plain at this moment. Between Stony Road and the dam site the predominant land use is agriculture and the general wish of the residents is that it be zoned to remain so.

The economic effectiveness of flood proofing of structures in these areas of proposed flood plain management has also been examined. Statistically, only the Bowmansville area justifies the cost of this measure. It should therefore be a requirement here for all existing buildings and future development.

18 - PLAN SELECTION

18.1 - General

The preceding Sections have presented, in brief, the details of the four schemes considered to have the potential to satisfy to the maximum possible extent the design Criteria. Each scheme has its own special advantages and disadvantages. The schemes with least capital cost have the major drawback of an inability to augment Creek flow. The scheme that best satisfies this requirement has, unfortunately, a high investment cost. Each item of outstanding merit has a parasitic drawback. To facilitate the sound selection of a Project, recourse is therefore made to the Multi-Objective Matrix for this project, Table 18.1.

18.2 - Multi-Objective Matrix

The multi-objective matrix has been designed to reflect the effect of the measures on four major objectives, namely, National Economic Development, Environmental Quality, Social Factors, and Regional Development. From a study of the data it will be seen that the Major Channelization and Diversion Channel schemes have a marked degree of similarity, and that the Sandridge Reservoir and Bowmansville Reservoir schemes are also very similar to each other.

It will be noted that the major difference between the channelization and reservoir schemes lies in the effect on Regional Development. Neither of the two channelization schemes provides low flow augmentation or water supply.

While all four schemes have B/C ratios exceeding unity, the scheme having the highest annual cost has the lowest B/C ratio.

18.3 - Public Participation and Co-ordination

All four schemes have been explained to a wide public; at workshops and public meetings. No one scheme satisfies

TABLE 18.1 - MULTI - OBJECTIVE MATRIX - ALTERNATIVE STUDIES, ELLICOTT CREEK, N.Y.

STUDY OBJECTIVES	UNIT	MAJOR CHANNELIZATION	DIVERSION CHANNEL	BOWMANSVILLE LAKE	SAMBRIDGE PLUS MINOR CHANNEL IMPROVEMENT
NATIONAL ECONOMIC DEVELOPMENT					
Urban flood damage reduction (annual)	$	665,000	690,000 (1)	722,000 (1)	762,000
Fish and wildlife benefit (annual)	$	-	-	-	237,000
Increased recreational opportunity (annual)	$	193,000	387,000 (1)	1,723,000	1,598,000 (1)
Low flow augmentation benefit (annual)	$	0	0	0	0
Municipal water supply benefit (annual)	$	0	0	0	148,000
Total annual benefits	$	858,000	1,077,000 (1)	2,445,000 (1)	2,745,000 (1)
Annual charges	$	421,300	643,400 (1)	1,161,000	2,619,000
Benefit/cost ratio		2.04	1.67 (1)	2.11 (1)	1.05 (1)
Net annual benefits over annual charges	$	436,700	433,600 (1)	1,284,000 (1)	126,000 (1)
Total investment cost	$	7,153,900	11,173,000 (1)	17,757,000	33,322,000
ENVIRONMENTAL QUALITY					
Water surface created	Acres	0	0	1,040	2,150
Effect on natural environment (wooded)	Acres	-3	-106	-450	-183
Effect on man made environment	Acres	0	0	-7	-50
Effect on open spaces (parks)	Acres	+16	+67.5	+112	+1100
Effect on unique natural areas	Acres	0	0	0	-1
Effect on stream flow	- 0 +	0	0	0	+
Pastoral stream (nautral)	Mi.	-7	-2	-3.3	-5.5
SOCIAL FACTORS					
Area protected	Acres	6013	6013	8400	7300
Drainage area controlled	Sq. Mi.	0	0	69	33.1
Industrices protected	No.	0	0	0	0
Businesses protected	No.	9	9	11	11
Essential services protected	No.	10	10	15	15
Total residences protected (1969)	No.	1304	1304	1529	1548
Total residences relocated	No.	5	11	53	82
Loss or gain on tax base (short term)	- 0 +	-	-	—	—
REGIONAL DEVELOPMENT					
Economic stability	- 0 +	+	+	+	+
Jobs created	- 0 +	0	0	+	+

(1) Revisions subsequent to late stage meeting on 2 May 1973.

everyone living or working in the basin. Indeed, each scheme has some group vehemently against it, and favoring another.

The schemes have been reviewed by a large number of governmental agencies. Comment has been received from, amongst others, the office of the Governor of the State of New York, the Fish and Wildlife Service of the Department of the Interior, the Bureau of Outdoor Recreation, the Erie-Niagara Counties Regional Planning Board and the State Department of Environmental Conservation.

Of the two channelization schemes, the general preference is for the Diversion Channel. **The main reason is that to the maximum extent possible, the natural beauty of the Creek would be preserved.** Where there are environmental ill-effects to the creek which cannot be avoided, the Diversion Channel keeps the affected reach-length to the minimum. While the Major Channel Improvement scheme involves environmental damage to seven miles of Ellicott Creek, the Diversion Channel affects only 2-1/2 miles of the Creek. The preservation of the natural beauty of the creek is very important to residents in the Basin and this has weighed heavily and in their reactions to the four measures.

Of the two reservoir schemes, the Sandridge reservoir has the more support. Indeed, the other reservoir proposal gets virtually no support from the Basin population.

The residents and Board of Lancaster where the Bowmansville Lake is sited, have protested strongly against this totally artificial lake. The dike failure will include a high fatality rate in Lancaster the site is presently proposed for an urgently needed and much desired industrial development project, the Department of Parks and Recreation will not support the recreation at this location, the area has an abundance of parkland and does not need any more, the site is less attractive than, Sandridge; these are some of the major objections from all sources to the proposal. They are valid and the Bowmansville Lake is rejected.

18.4 - Plan Selection

The choice optimum scheme for flood control and other benefits on Ellicott Creek lies between the Diversion Channel and the Sandridge Reservoir. Selection of a project is difficult as both schemes have much merit in them, and at the same time have many drawbacks.

Based on all the information presented in this report, the Appendices, the general choice of the people in the Basin as expressed at the public meetings and the comments of the reviewing Agencies, the recommended plan for a project is the Diversion Channel. It is environmentally sound, economically justifiable, provides flood protection immediately and causes a minimum of social upheaval.

As a concomitant part of the project it is recommended that flood plain management be a requirement from all local governments having jurisdiction along any part of the length of Ellicott Creek.

It is appreciated that the Diversion Channel is not the choice of all. This has been one of the difficulties of the Review Survey; no one scheme satisfies everyone. It is important to record that the other of the two schemes from which the choice is to be made, is the preferred scheme for the Office of the Governor of the State of New York. A copy of the letter in which the Governor makes this preferment known is attached immediately hereafter.

STATE OF NEW YORK
EXECUTIVE CHAMBER
ALBANY 12224

NELSON A. ROCKEFELLER
GOVERNOR

June 5, 1973

Dear Colonel Moore:

After thorough consideration of the Corps' Ellicott Creek Restudy by all concerned agencies of the State of New York, the State remains convinced that the Sandridge Lake and Ellicott Creek minor channel improvements project, as authorized by the Omnibus Rivers and Harbors Act of 1970, will best meet the overall needs of the area, and that the other three alternatives being evaluated are unacceptable.

Investigation of the desirability and feasibility of this project formally began, under State auspices, more than a decade ago. The Erie-Niagara Basin Regional Water Resources Planning Board, which was the first such agency established under New York's statewide water resources planning program, undertook a comprehensive planning program in which the Corps and other federal agencies played a crucial cooperative role. The product of this seven-year planning program was the Erie-Niagara Basin Plan, issued in 1970.

The Plan proposed the Sandridge project as a critical element of the overall program to meet the water resource and associated needs of the Basin. Sandridge was included in the early action program under the Plan, and was assigned the highest priority for implementation.

On the basis of the report by the Corps of Engineers on the Ellicott Creek Basin, which confirmed the Basin Board's

recommendation and at the urging of the State of New York, authorization for the project was included in the Omnibus Rivers and Harbors Act of 1970. This authorization, however, included a requirement that all possible alternative methods be investigated by the Corps prior to commencement of the Sandridge project.

None of the three project alternatives to the Sandridge project under evaluation as part of the Ellicott Creek Restudy would meet the overall needs of the basin.

Both the Major Channel Improvement and Diversion Channel alternatives would be seriously disruptive of the natural environment of the most densely populated area of the Ellicott Creek Basin. Both fail to provide for low-flow augmentation.

The Bowmansville Reservoir alternative fails to provide low-flow augmentation, substantial regional recreational benefits, or water supply potential.

On the other hand, the Sandridge project, including the minor downstream channel improvements which are part of it, will meet the crucial needs of the basin and will provide substantial benefits in terms of fish and wildlife, recreation, water supply, and low-flow augmentation in the interests of a quality urban environment.

In terms of flood control, the Sandridge project would accomplish the greatest degree of flood damage reduction. In the case of each of the three alternatives as well as Sandridge, adequate flood plain management efforts will also be required to achieve optimum protection of the basin from flood losses.

The minor downstream channel improvements which are part of the Sandridge project will afford substantial flood control benefits by themselves. These improvements could be accomplished expeditiously as the first phase of the overall project; thus, significant immediate benefit will ensue from the Sandridge project which would not be available from the alternatives.

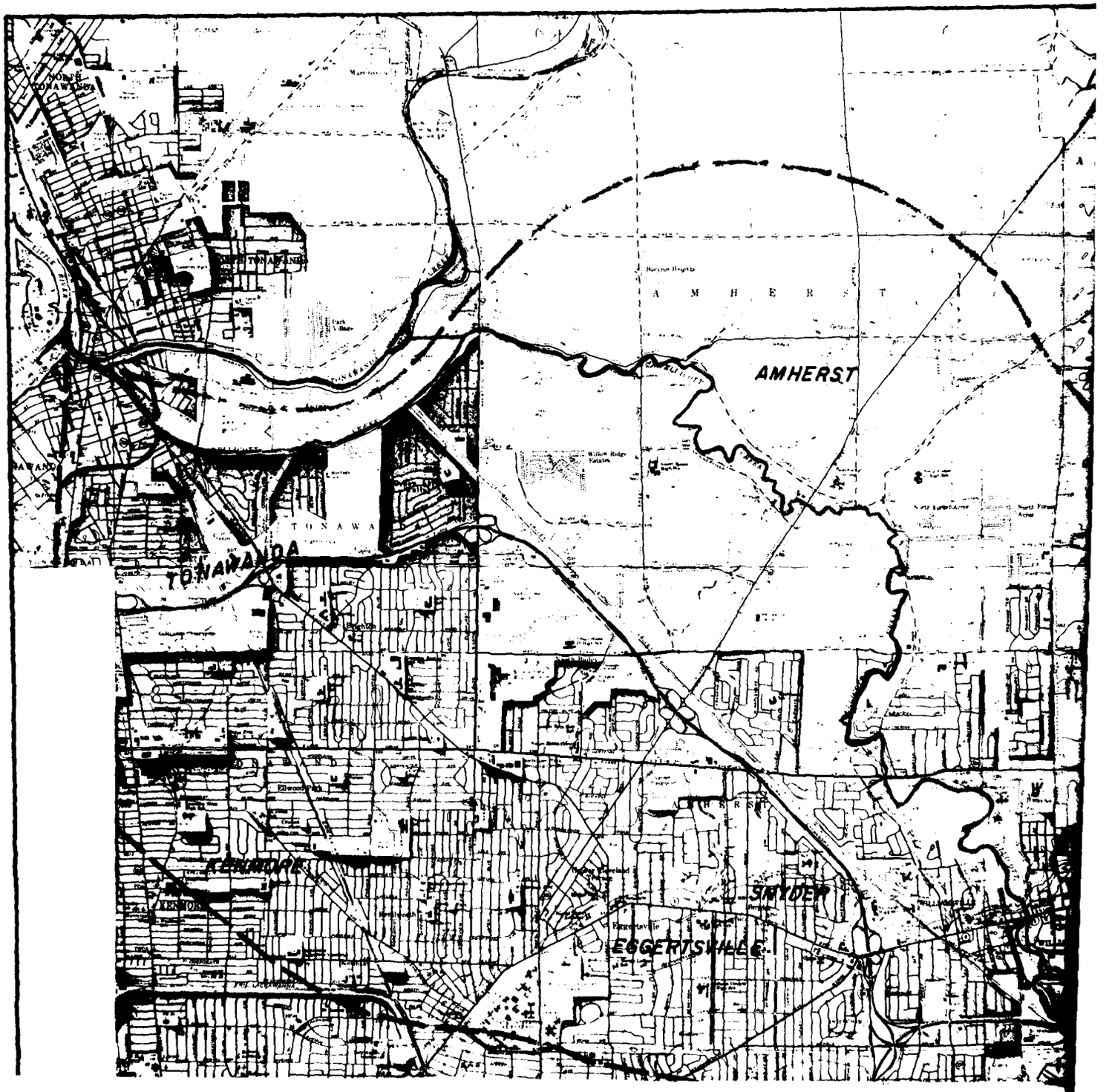
June 5, 1973

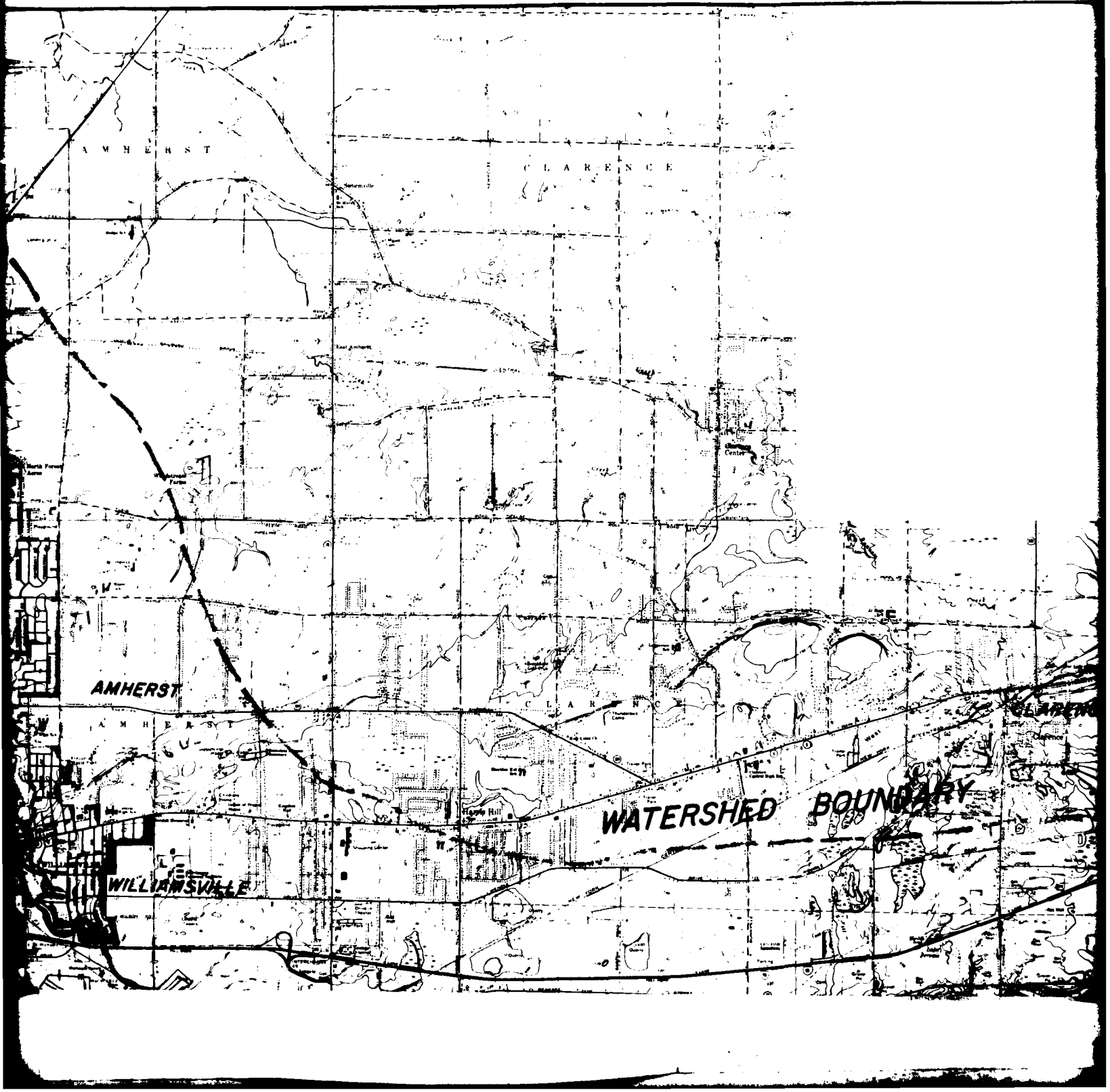
Accordingly, the State of New York, after review of the alternatives, the reports thereon, and the views presented at the May 2 public hearing, reaffirms its support for the Sandridge Lake and Ellicott Creek minor channel improvements project, as authorized by the Omnibus Rivers and Harbors Act of 1970.

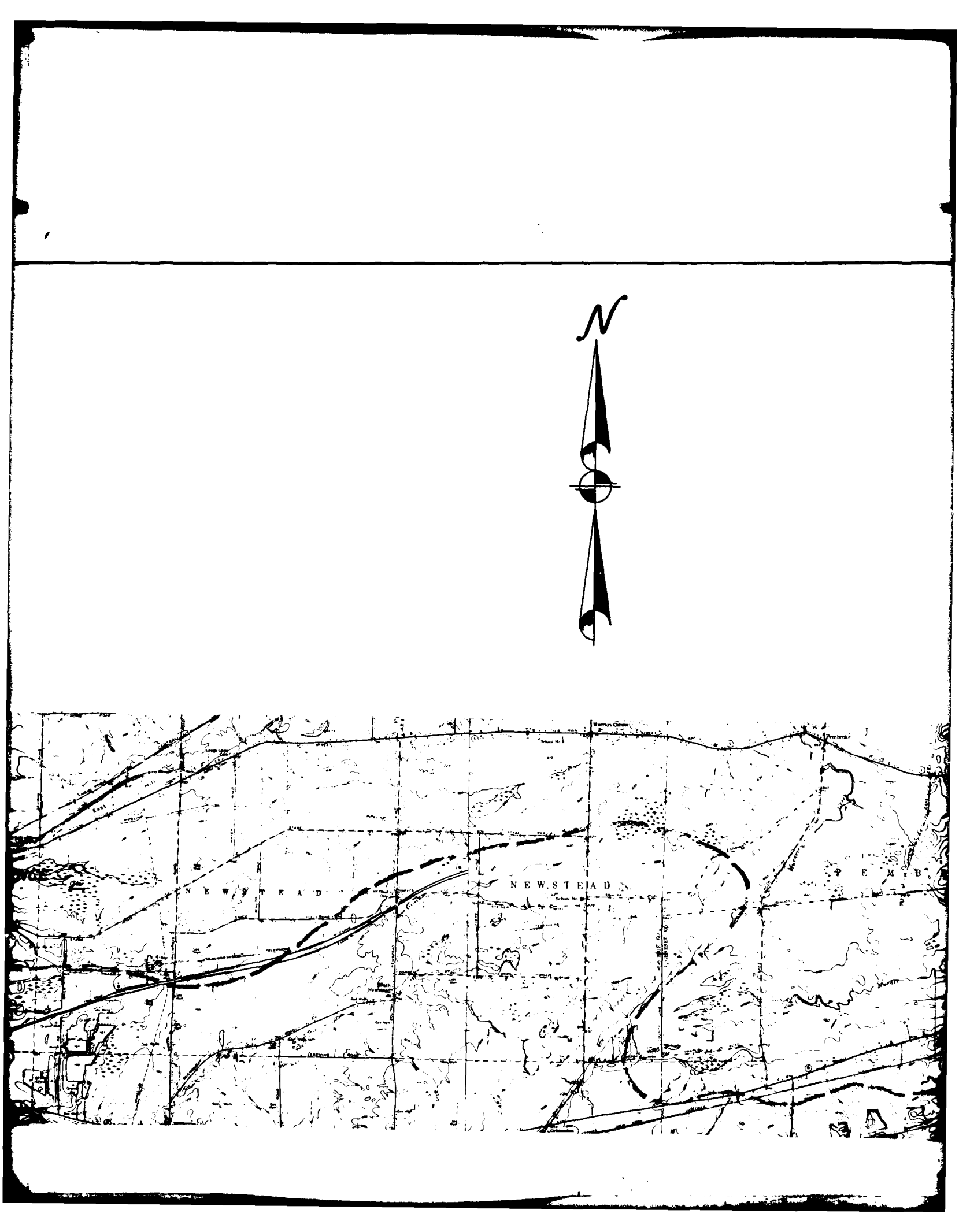
Because it is the State's hope that this project will be initiated expeditiously, we urge quick completion of your Report. We also urge that appropriations be provided the Corps to enable the immediate construction of the minor channel improvements, as well as for detailed design of the remainder of the project. In addition, we urge the Corps to recommend special appropriations for the development of additional detailed flood plain mapping for the Basin so that meaningful flood plain management actions may be taken coordinate with the effectuation of the project.

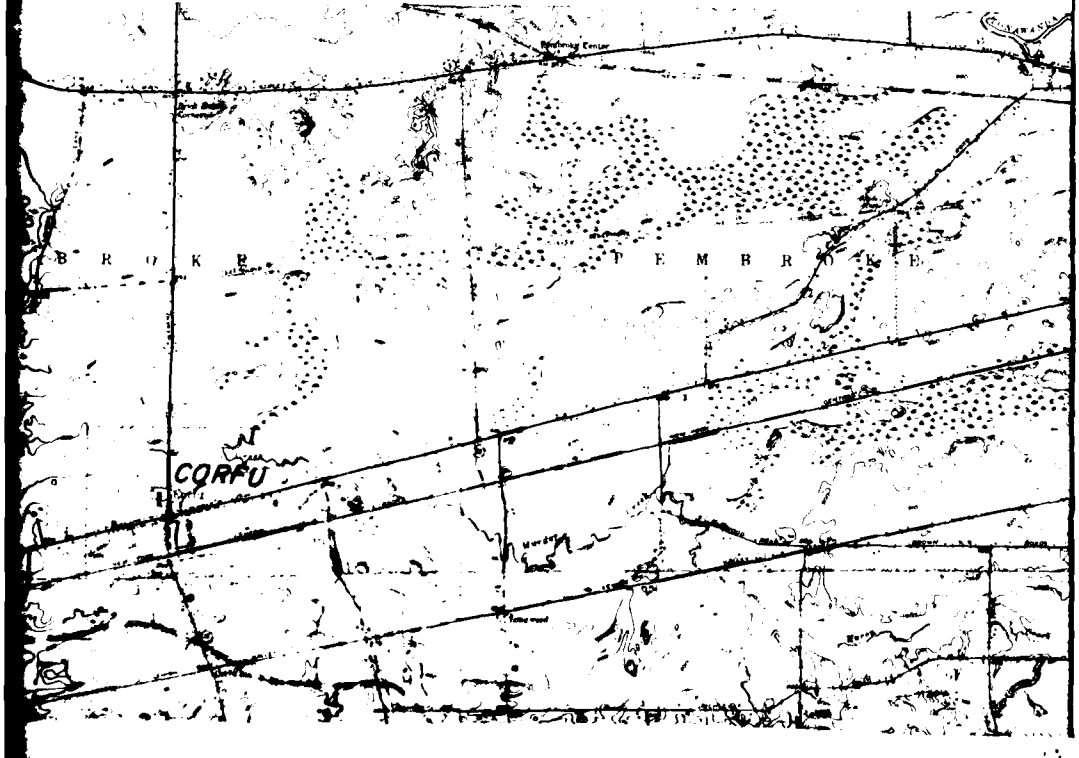
Sincerely,

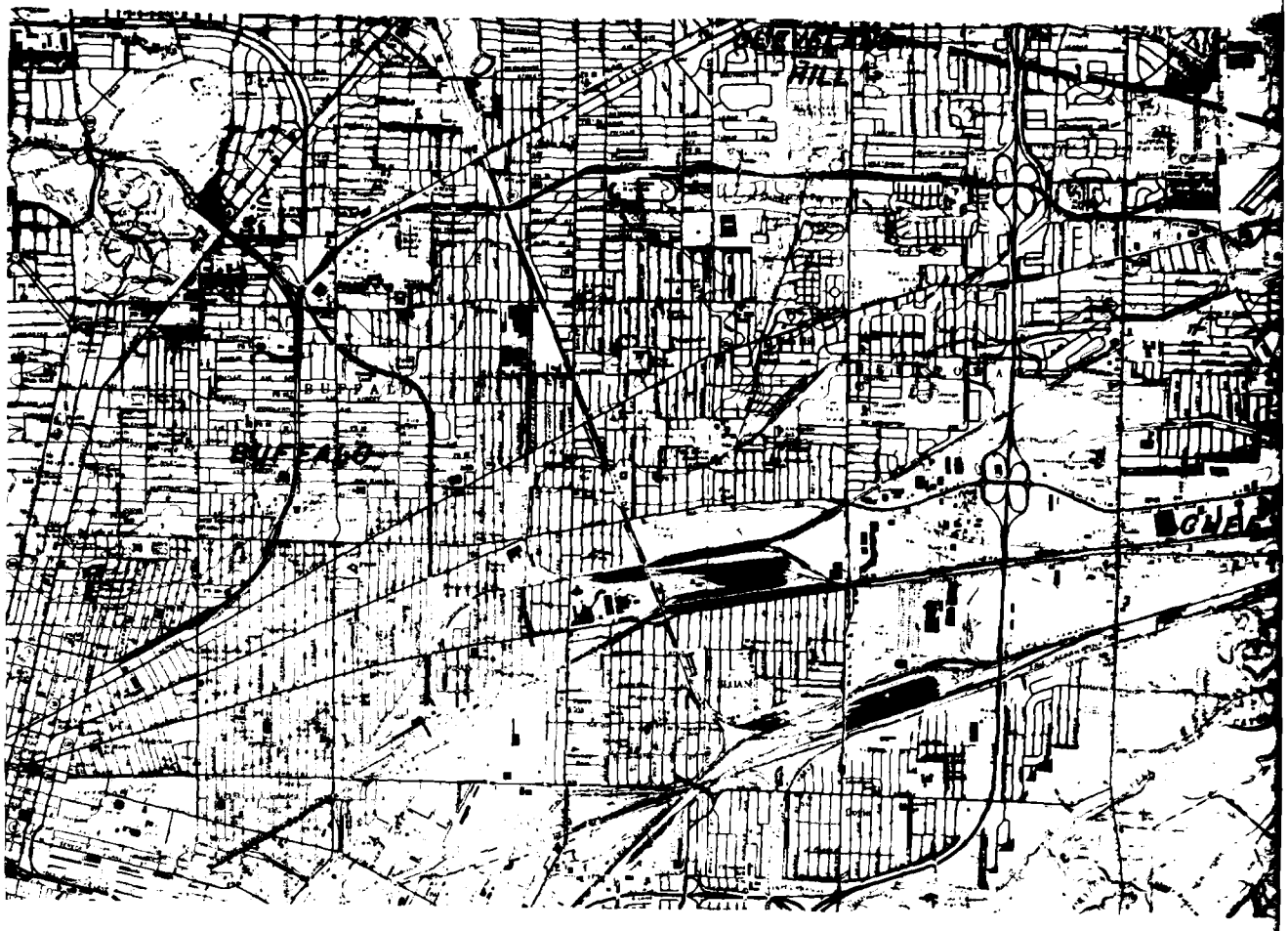
Colonel Robert L. Moore
Buffalo District
Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207


AMHERST
TONAWANDA
KENMORE
SNYDER
EGGERTSVILLE

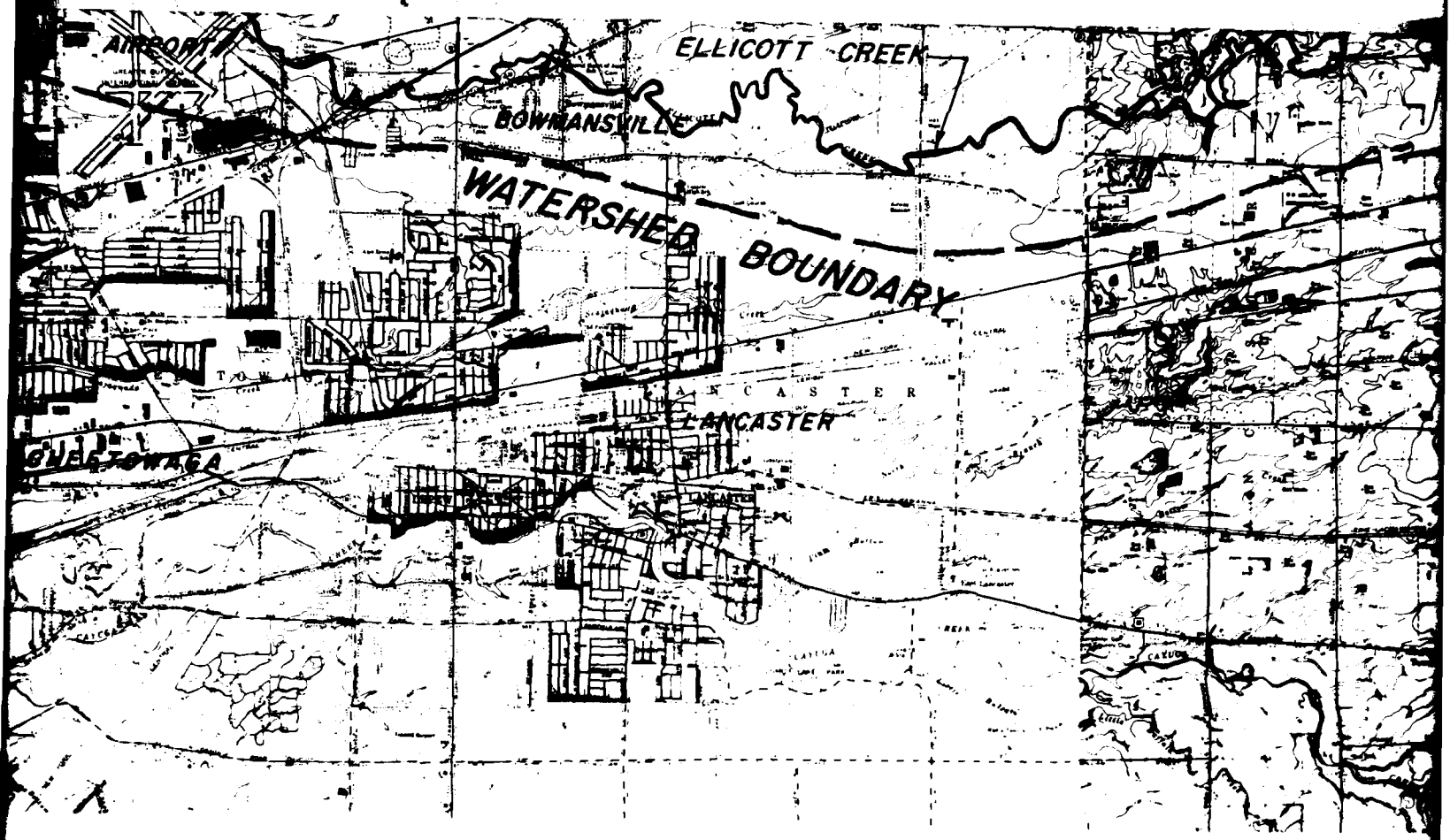

AMHERST
CLARENCE
AMHERST
CLARENCE
WILLIAMSVILLE
WATERSHED BOUNDARY


N
NEWSTEAD
NEWSTEAD


CORFU



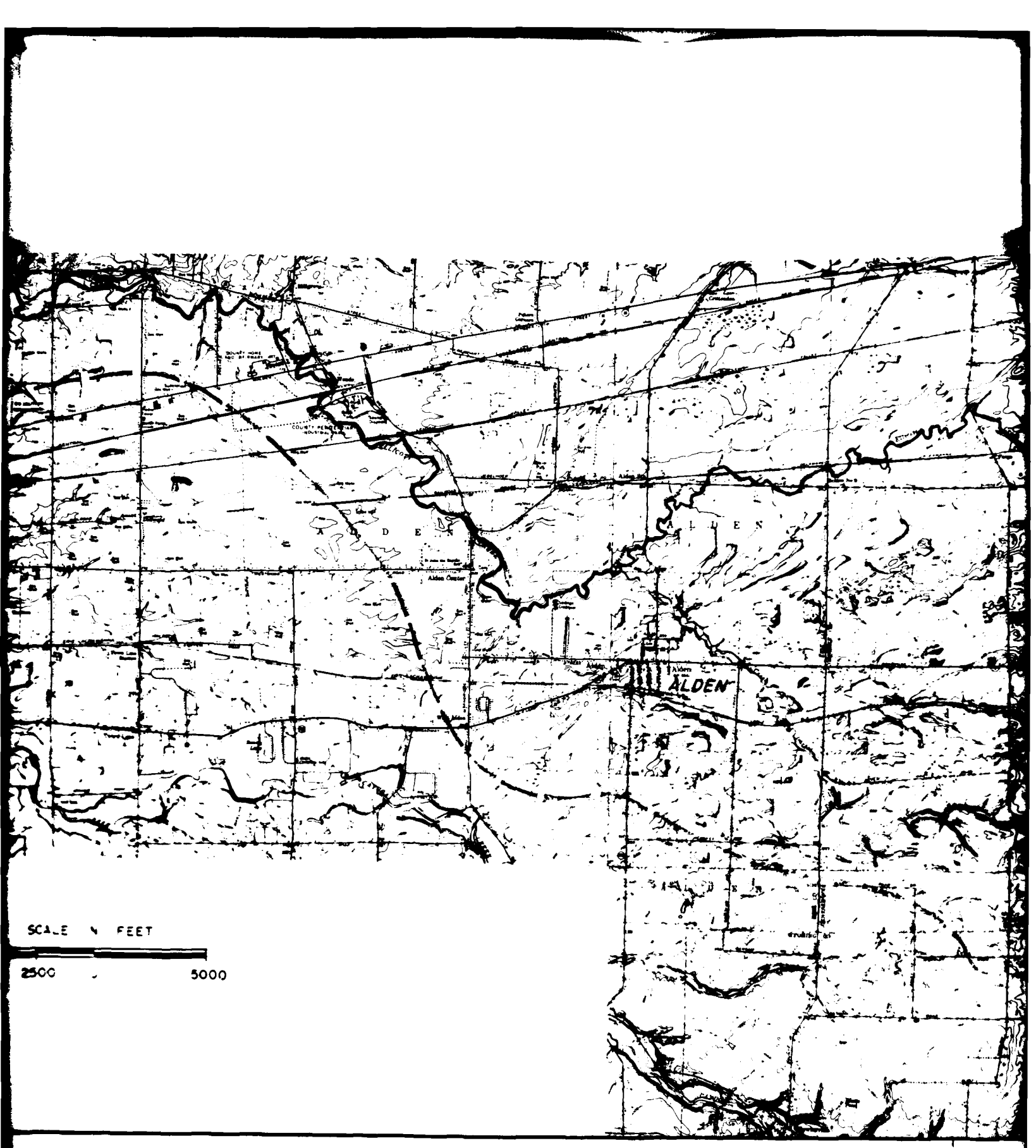
PHOTOGRAPHED FROM UNITED STATES DEP

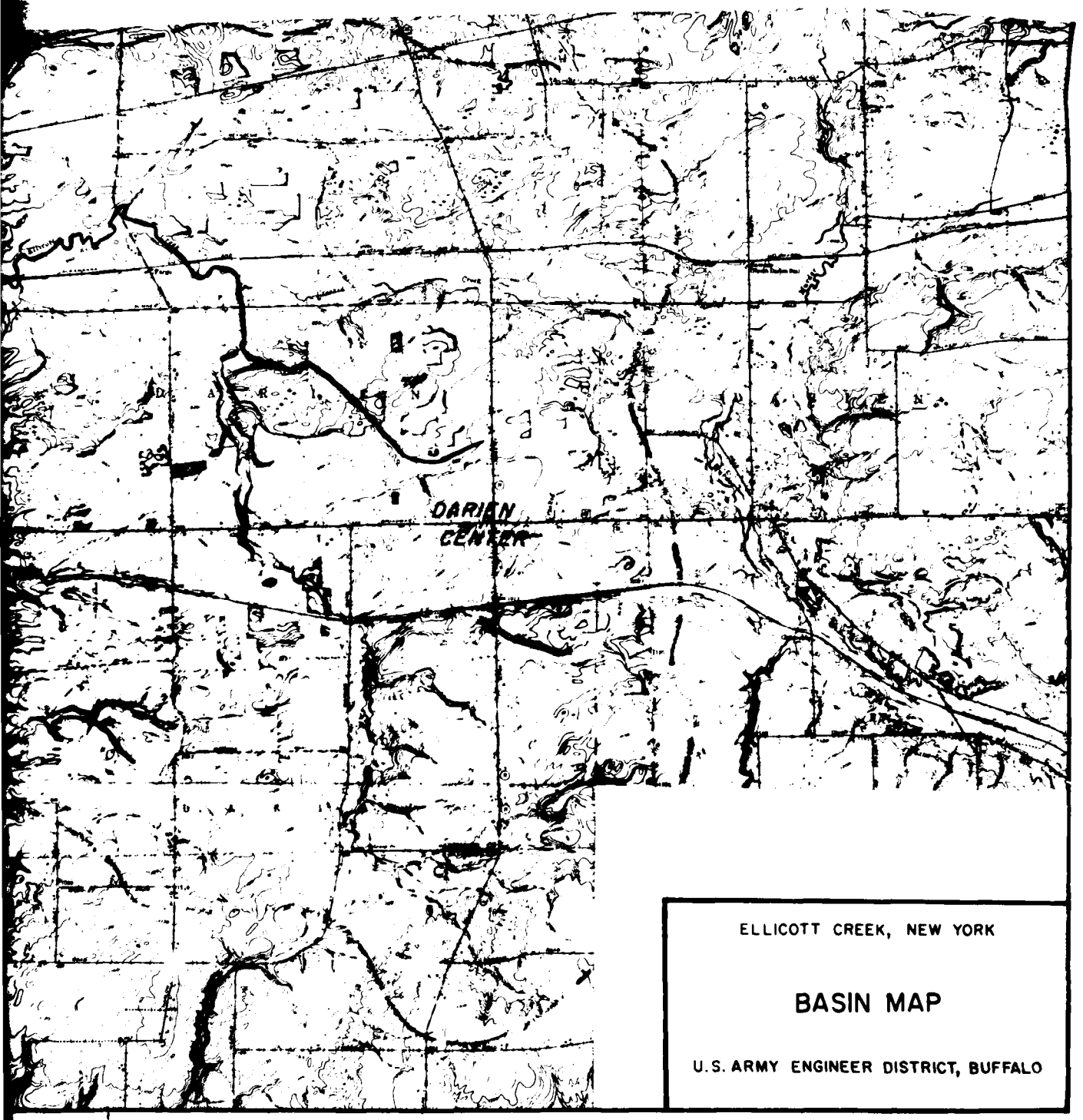


TES DEPARTMENT OF THE INTERIOR GEOLOGICAL SURVEY MAPS

SCALE IN

5000 2500 0


ALDEN
ALDEN
ALDEN
SCALE IN FEET
2500
5000

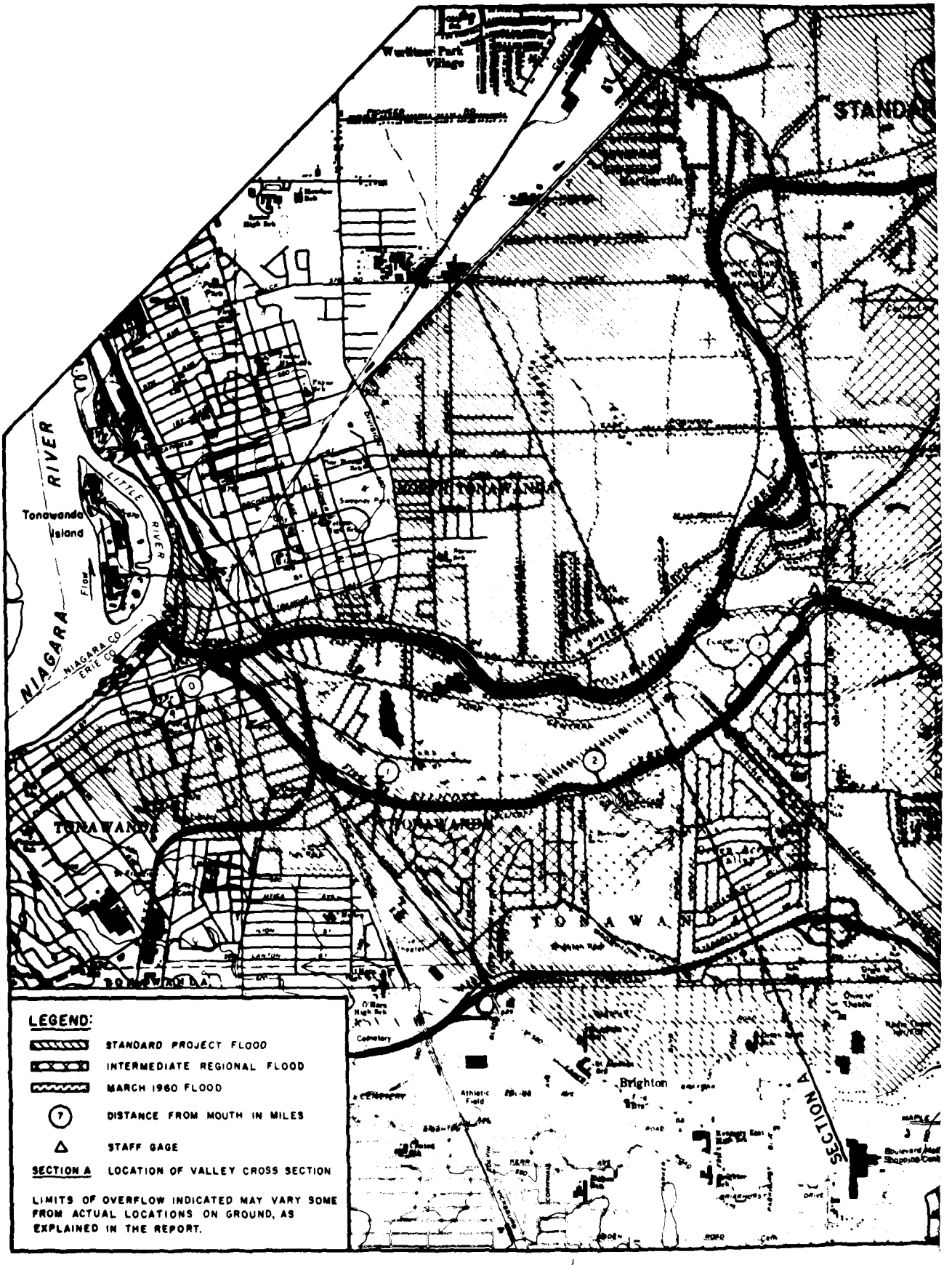


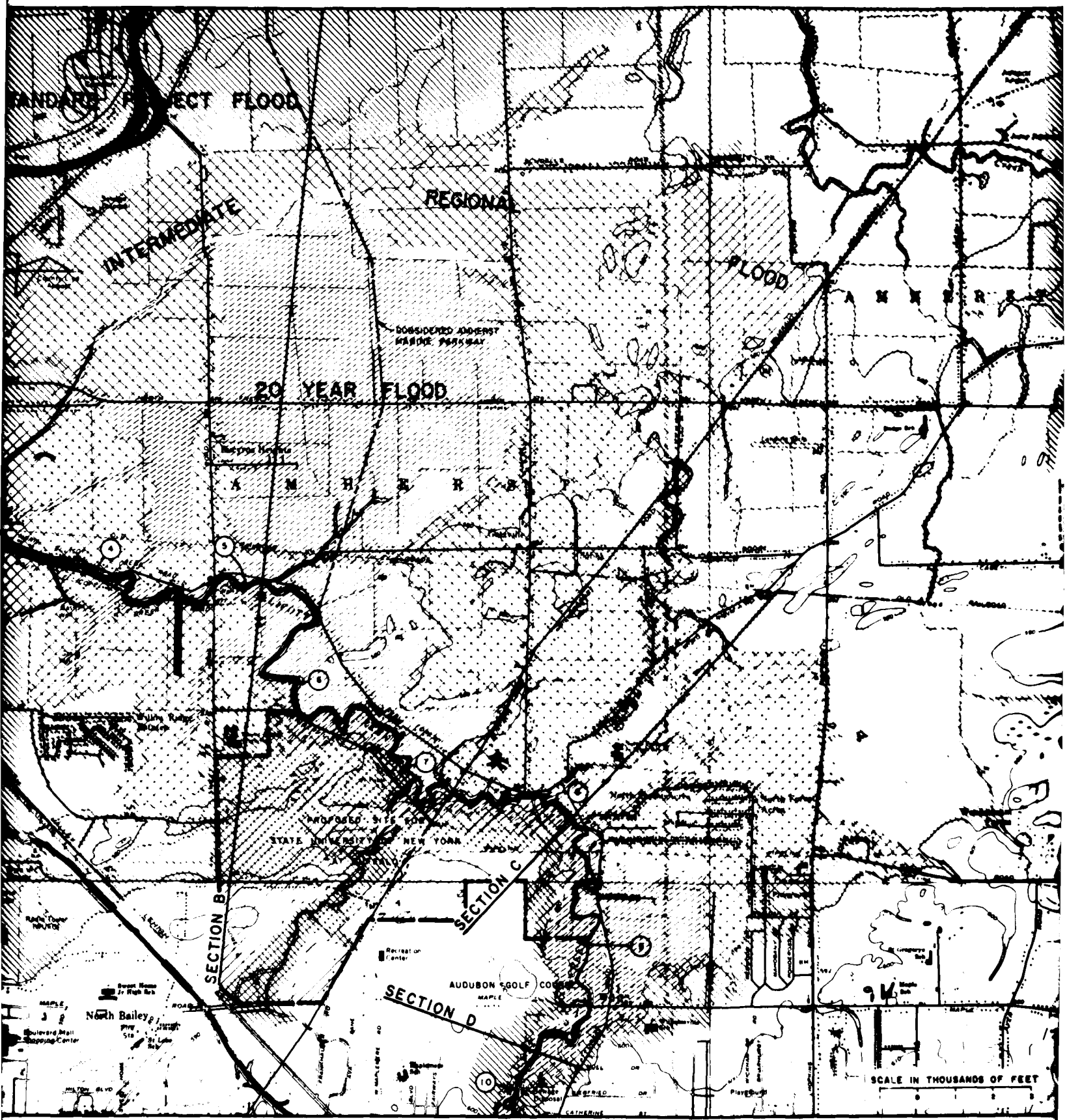
ELLICOTT CREEK, NEW YORK

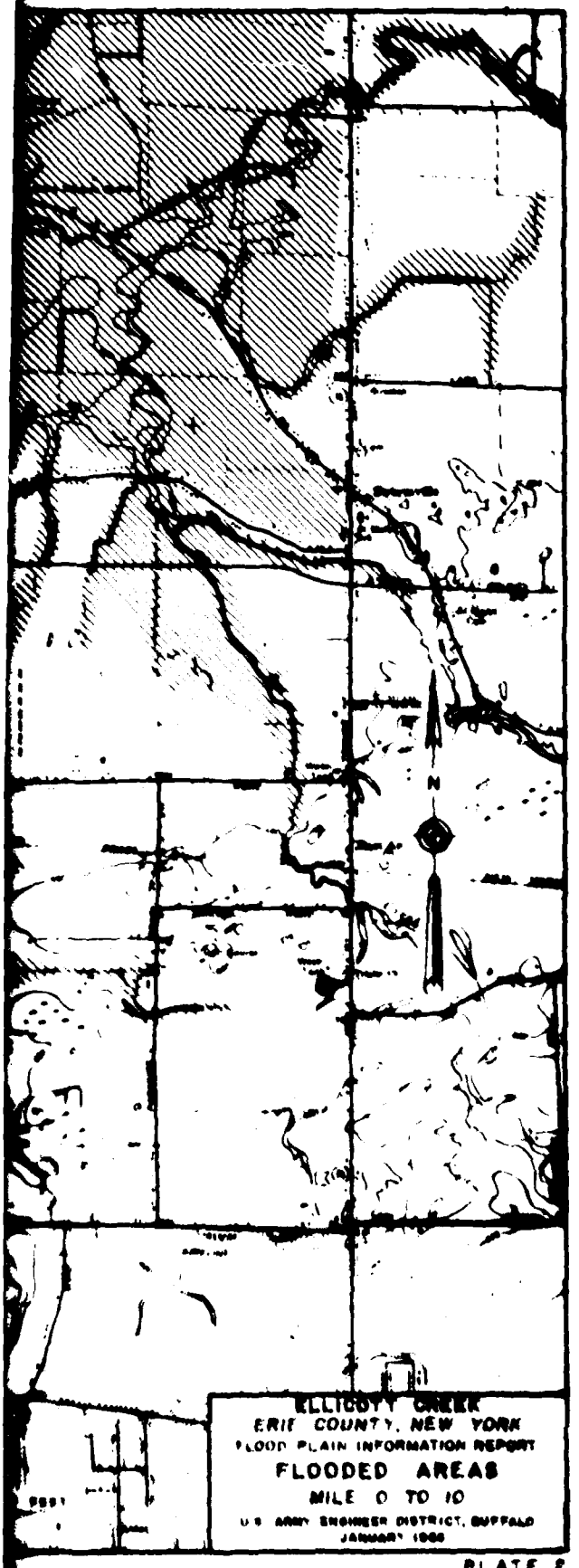
BASIN MAP

U.S. ARMY ENGINEER DISTRICT, BUFFALO

PLATE 1

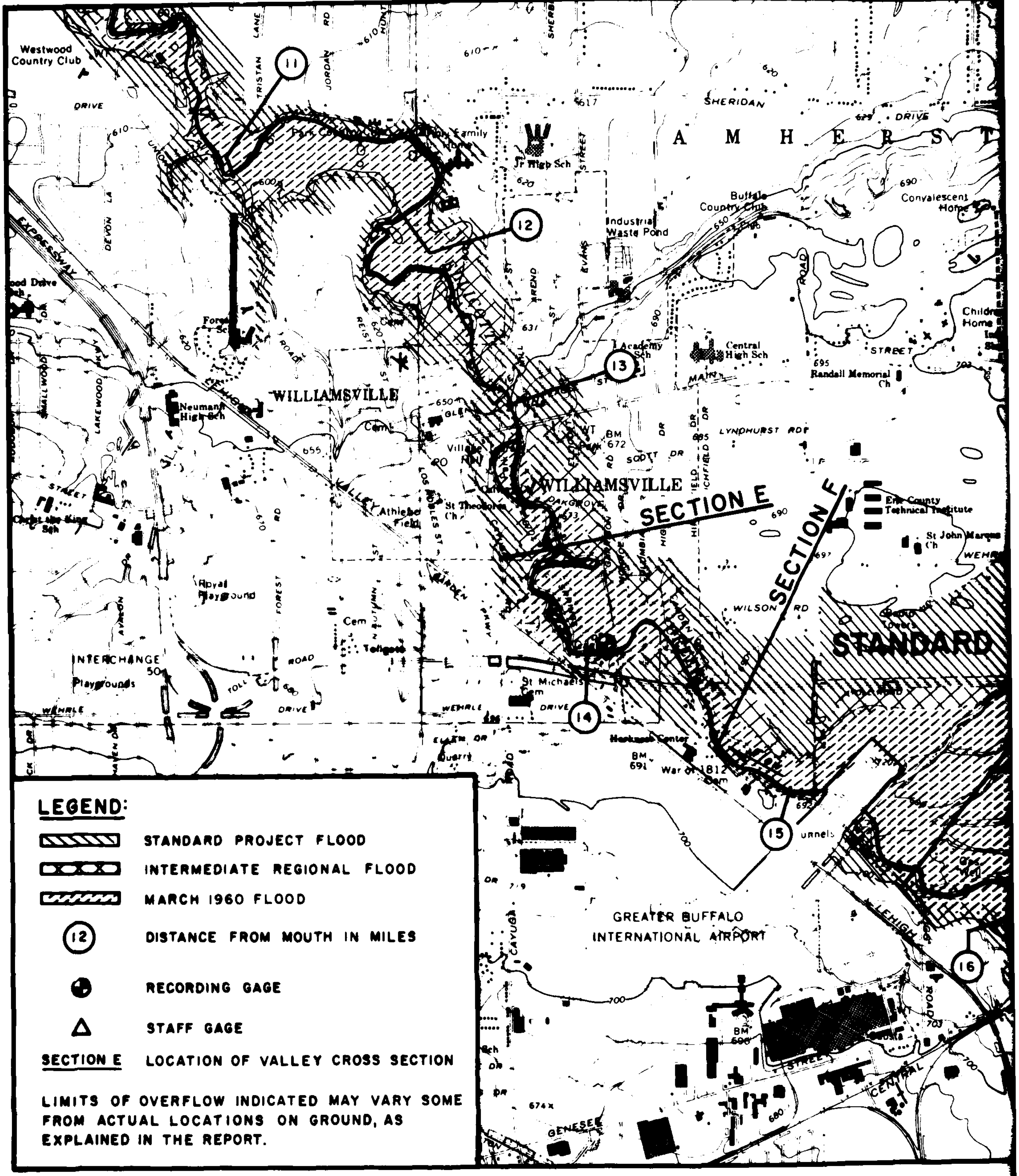

NIAGARA RIVER
LITTLE RIVER
Tonawanda Island
Flow
NIAGARA CO
ERIE CO
TONAWANDA
Brighton
SECTION A
LEGEND:
STANDARD PROJECT FLOOD
INTERMEDIATE REGIONAL FLOOD
MARCH 1960 FLOOD
DISTANCE FROM MOUTH IN MILES
STAFF GAGE
SECTION A LOCATION OF VALLEY CROSS SECTION
LIMITS OF OVERFLOW INDICATED MAY VARY SOME FROM ACTUAL LOCATIONS ON GROUND, AS EXPLAINED IN THE REPORT.

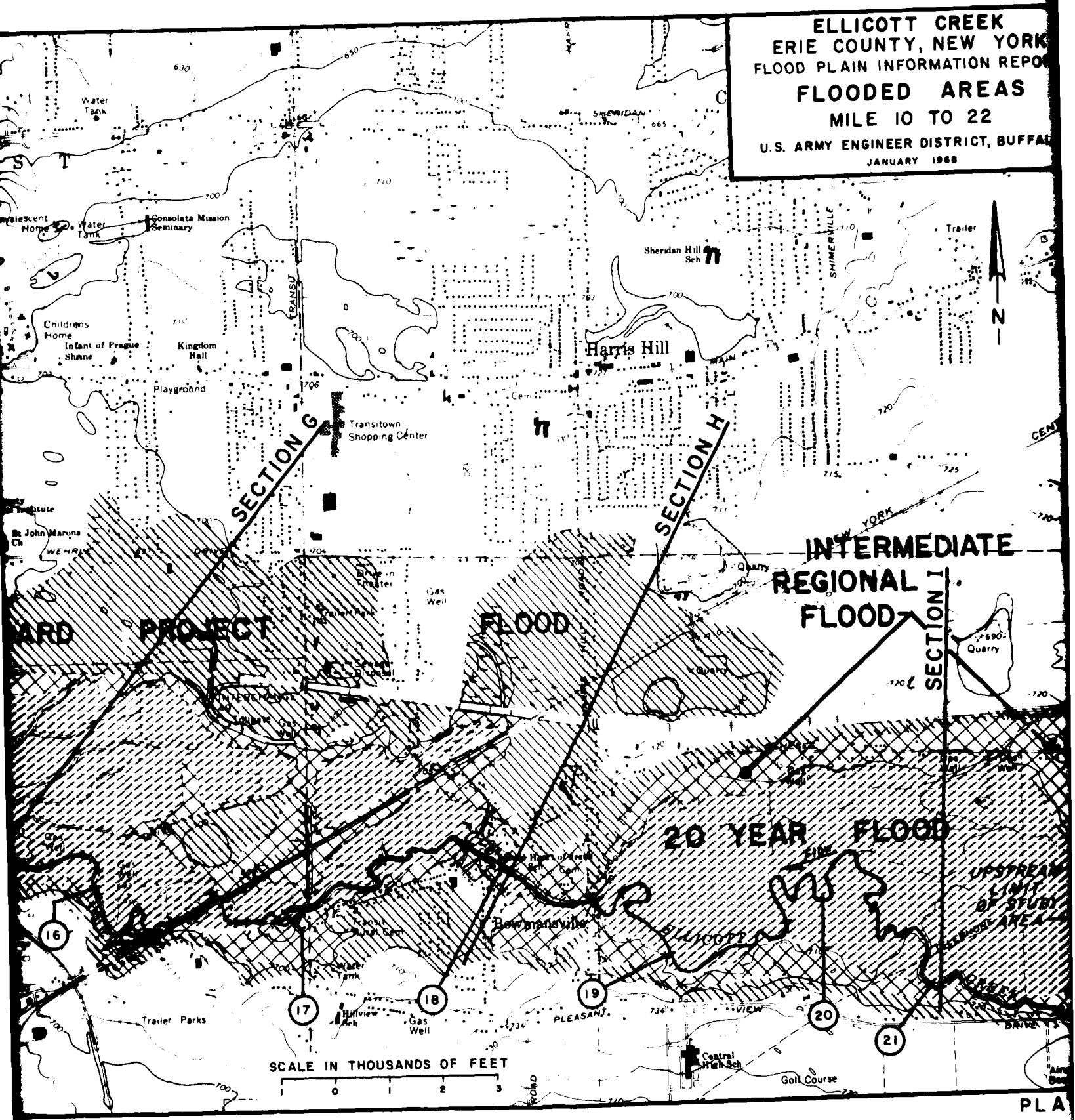

STANDARD PROJECT FLOOD
INTERMEDIATE REGIONAL FLOOD
AMHERST
CONSIDERED AMHERST MARINE PARKWAY
20 YEAR FLOOD
AMHERST
PROPOSED SITE FOR STATE UNIVERSITY OF NEW YORK
SECTION B
SECTION C
SECTION D
AUDUBON GOLF COURSE
North Bailey
SCALE IN THOUSANDS OF FEET



ELLICOTT CREEK
ERIE COUNTY, NEW YORK
FLOOD PLAIN INFORMATION REPORT
FLOODED AREAS
MILE 0 TO 10
U.S. ARMY ENGINEER DISTRICT, BUFFALO
JANUARY 1966

PLATE 8


Westwood Country Club
AMHERST
SHERIDAN
DRIVE
Jr High Sch
Buffalo Country Club
Convalescent Home
Industrial Waste Pond
EXPRESSWAY
WILLIAMSVILLE
Academy Sch
Central High Sch
Randall Memorial Ch
Neumann High Sch
LYNDHURST RD
WILLIAMSVILLE
SECTION E
SECTION F
Erie County Technical Institute
St John Marque Ch
Athletic Field
St Theodores Ch
Royal Playground
WILSON RD
STANDARD
INTERCHANGE 50
Playgrounds
St Michaels Cem
WEHRLE DRIVE
Harkness Center
BM 691
War of 1812 Cem
GREATER BUFFALO INTERNATIONAL AIRPORT
GENESEE
11
12
13
14
15
16
LEGEND:
STANDARD PROJECT FLOOD
INTERMEDIATE REGIONAL FLOOD
MARCH 1960 FLOOD
DISTANCE FROM MOUTH IN MILES
RECORDING GAGE
STAFF GAGE
SECTION E LOCATION OF VALLEY CROSS SECTION
LIMITS OF OVERFLOW INDICATED MAY VARY SOME FROM ACTUAL LOCATIONS ON GROUND, AS EXPLAINED IN THE REPORT.


ELLICOTT CREEK
ERIE COUNTY, NEW YORK
FLOOD PLAIN INFORMATION REPO
FLOODED AREAS
MILE 10 TO 22
U.S. ARMY ENGINEER DISTRICT, BUFFA
JANUARY 1968
N
SECTION G
SECTION H
SECTION I
INTERMEDIATE REGIONAL FLOOD
20 YEAR FLOOD
ARD PROJECT FLOOD
Harris Hill
Transitown Shopping Center
Playground
Childrens Home
Infant of Prague Shrine
Kingdom Hall
Consolata Mission Seminary
Water Tank
Sheridan Hill Sch
Trailer
Quarry
Bowmansville
Trailer Parks
Hillview Sch
Gas Well
Central High Sch
Golf Course
SCALE IN THOUSANDS OF FEET
0
1
2
3
16
17
18
19
20
21

EEK
W YORK
TION REPORT
REAS
22
ICT, BUFFALO

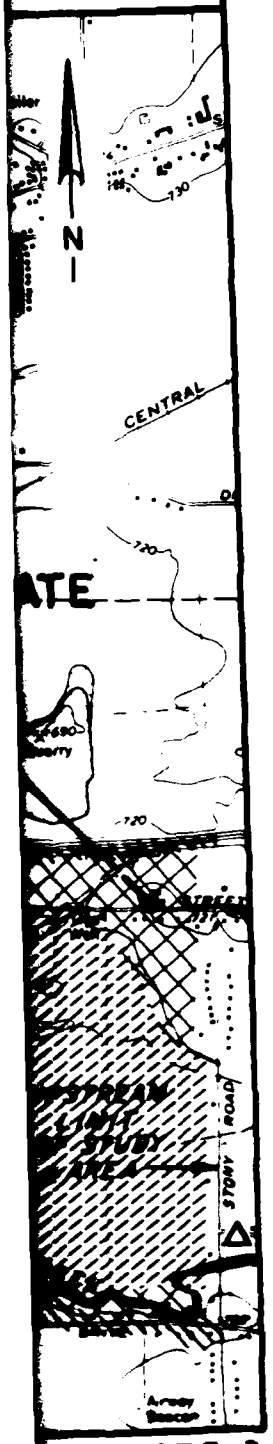
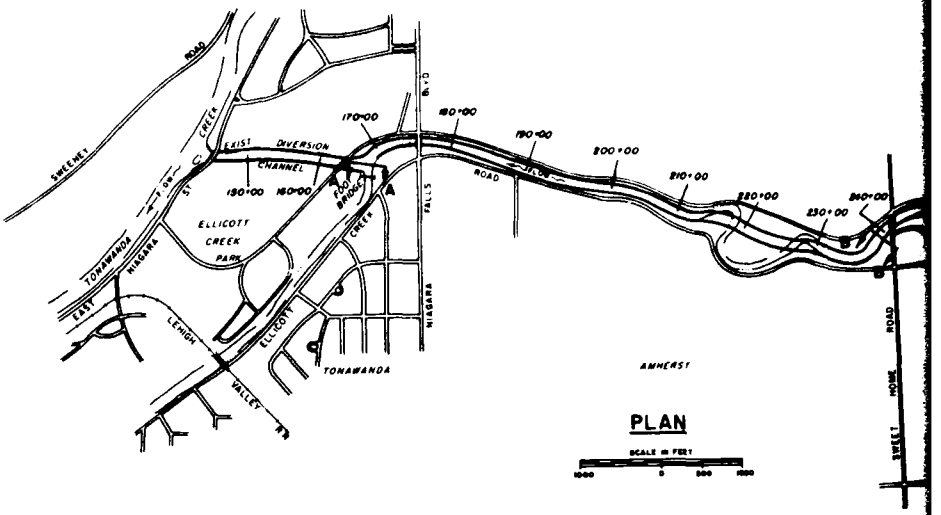
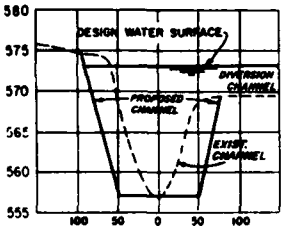
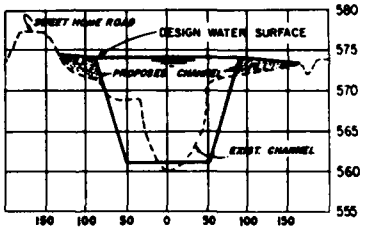


PLATE 3

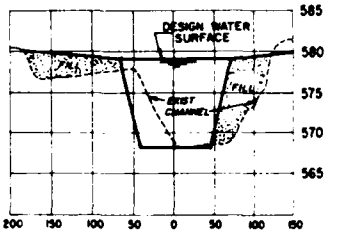




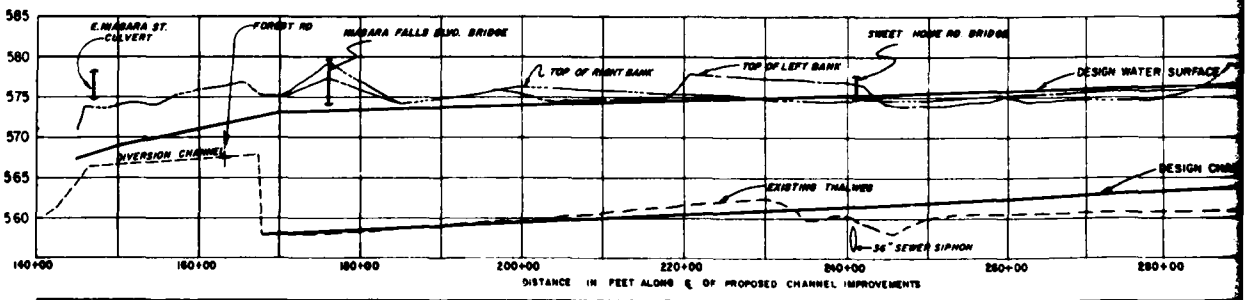
SECTION A-A

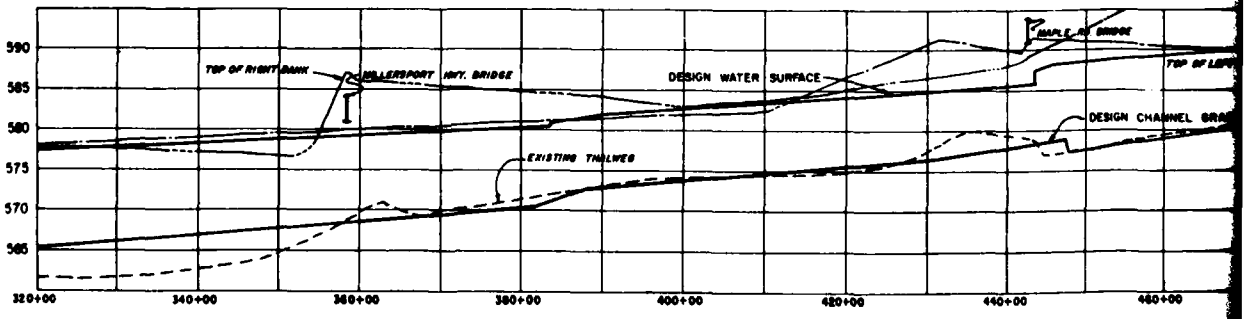


SECTION B-B

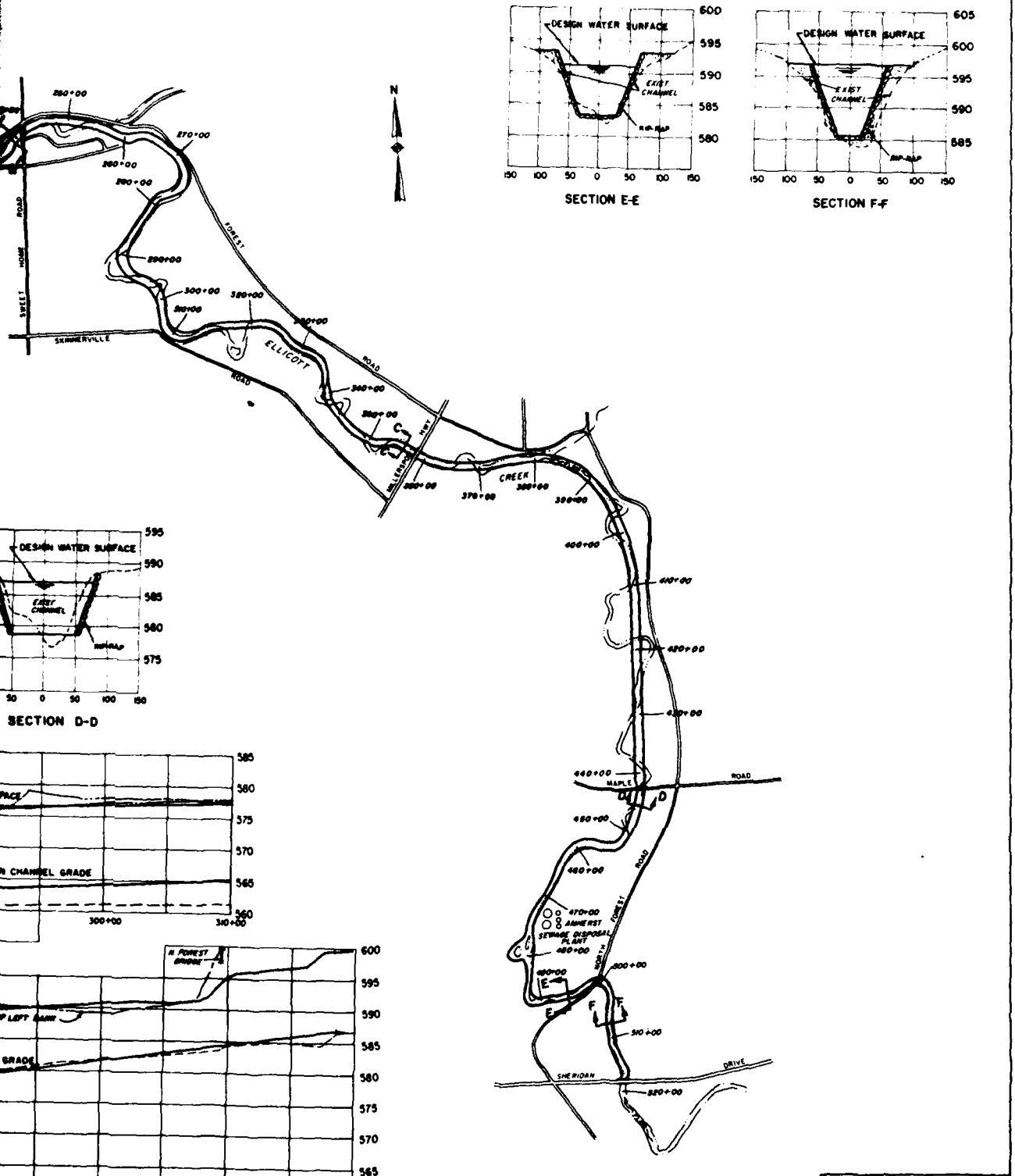


SECTION C-C





PROFILE

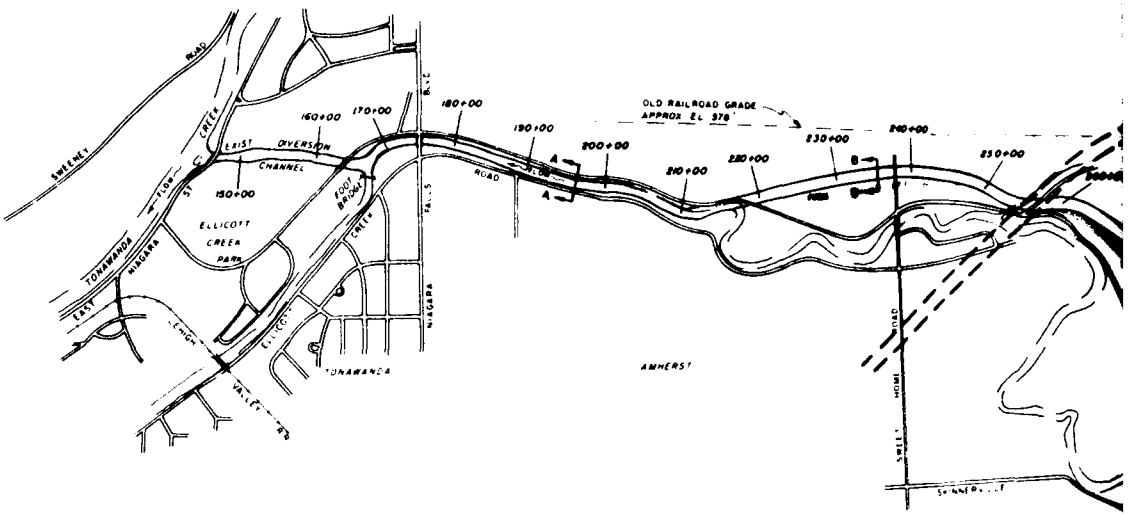


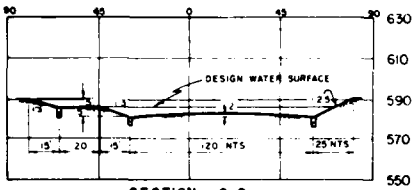
ELLICOTT CREEK, NEW YORK

MAJOR CHANNEL IMPROVEMENTS

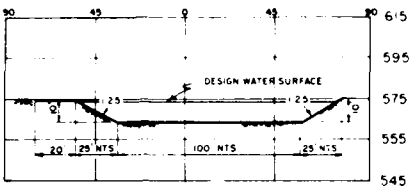
U S ARMY ENGINEER DISTRICT, BUFFALO

PLATE 4





SECTION C-C



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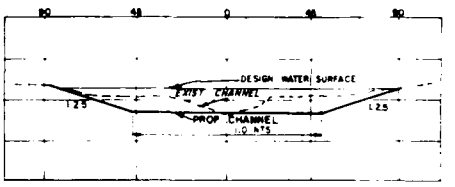
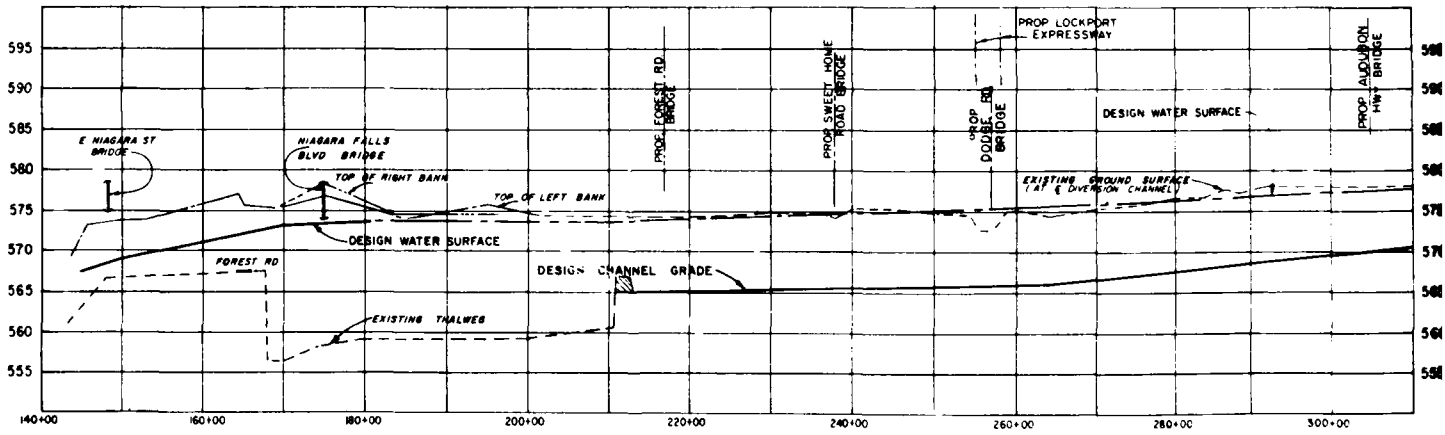
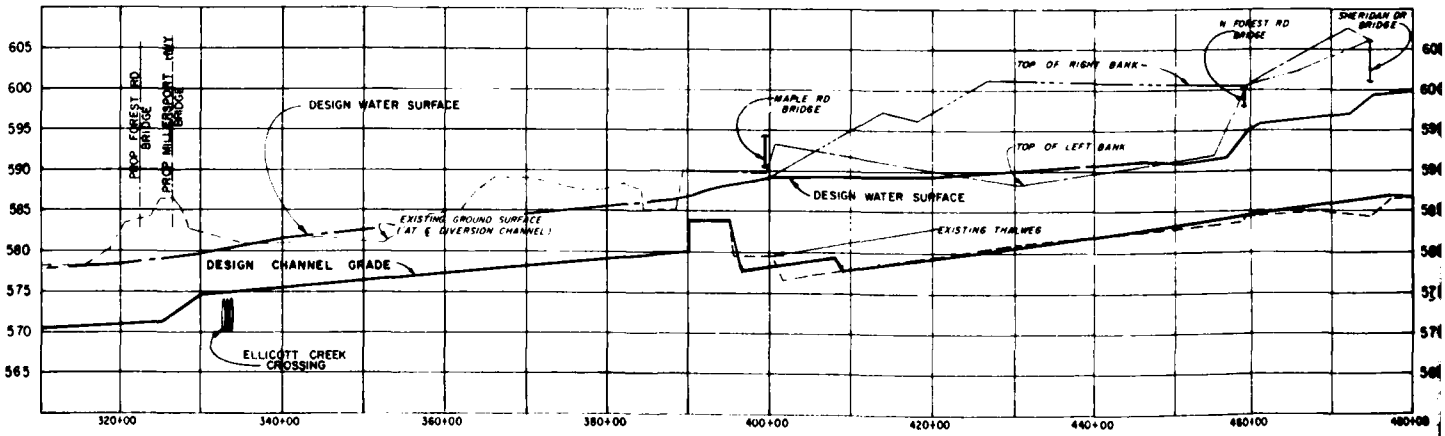


SECTION A-A





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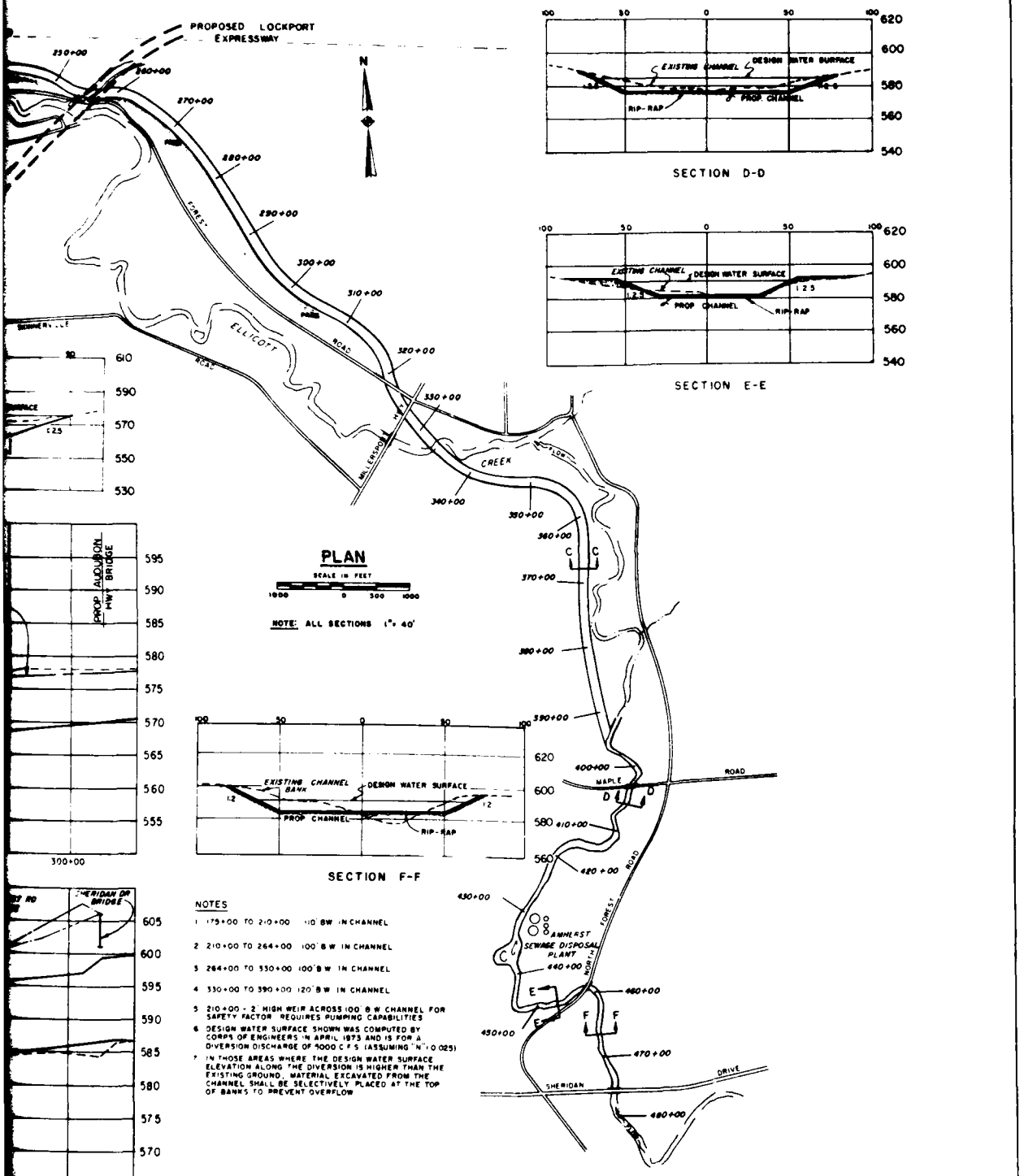

DIVERSION CHANNEL

REV 1 (4/30/73)

AD-A101 344 CORPS OF ENGINEERS BUFFALO N Y BUFFALO DISTRICT F/G 13/2
ELLICOTT CREEK BASIN, NEW YORK. WATER RESOURCES DEVELOPMENT, PH--ETC(U)
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UNCLASSIFIED NL

2 OF 2
AD A101 344

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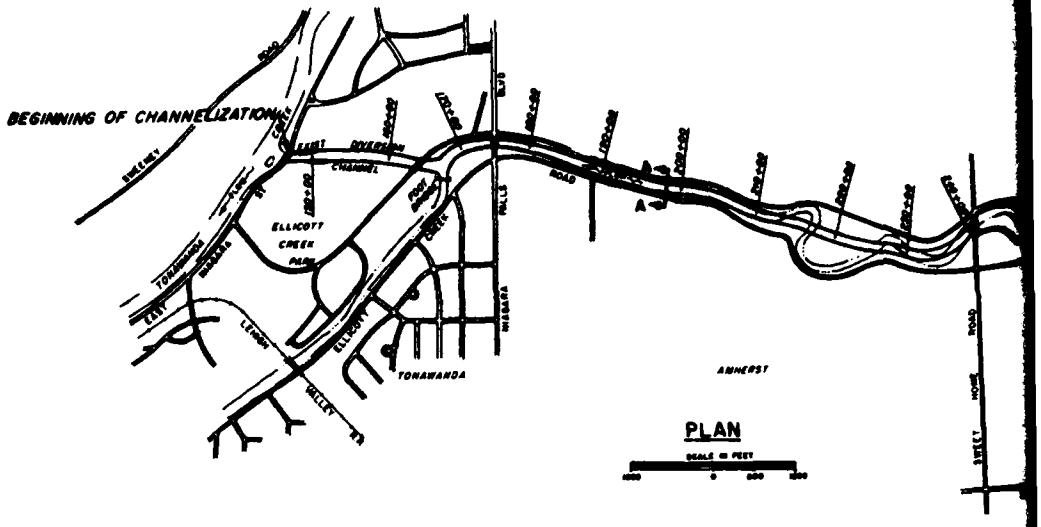

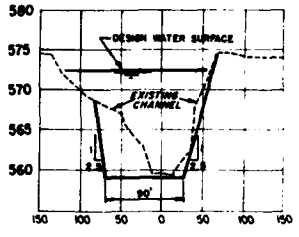

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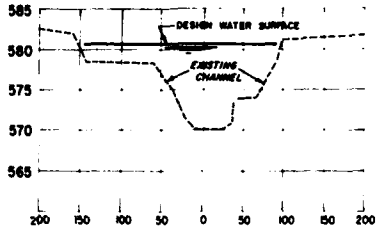

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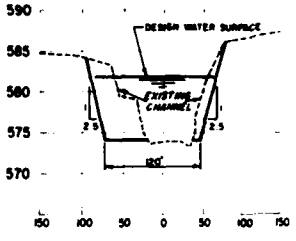
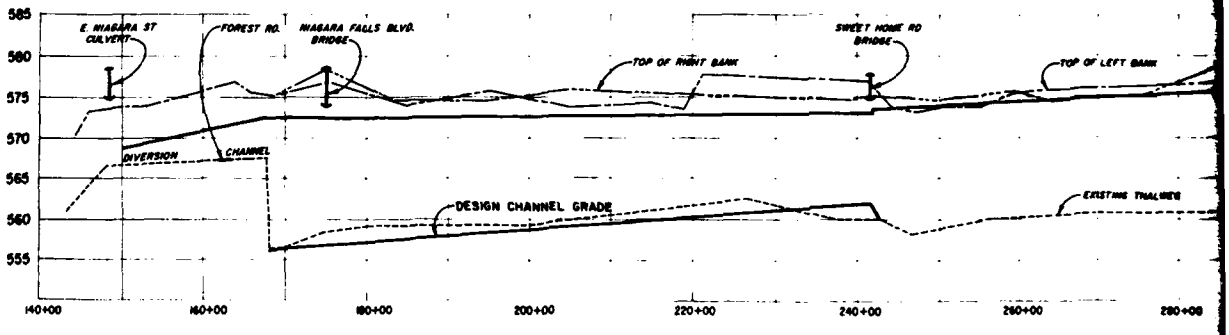
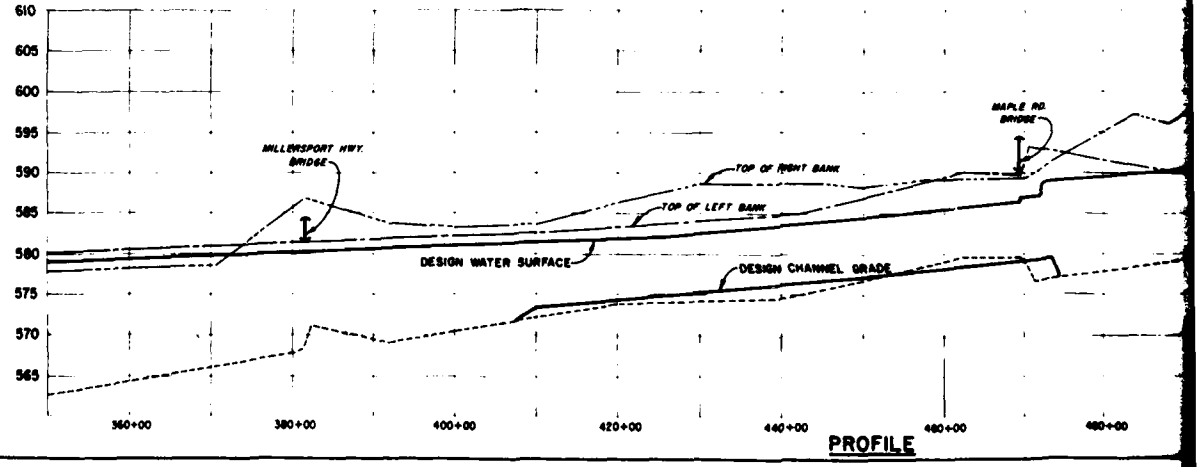
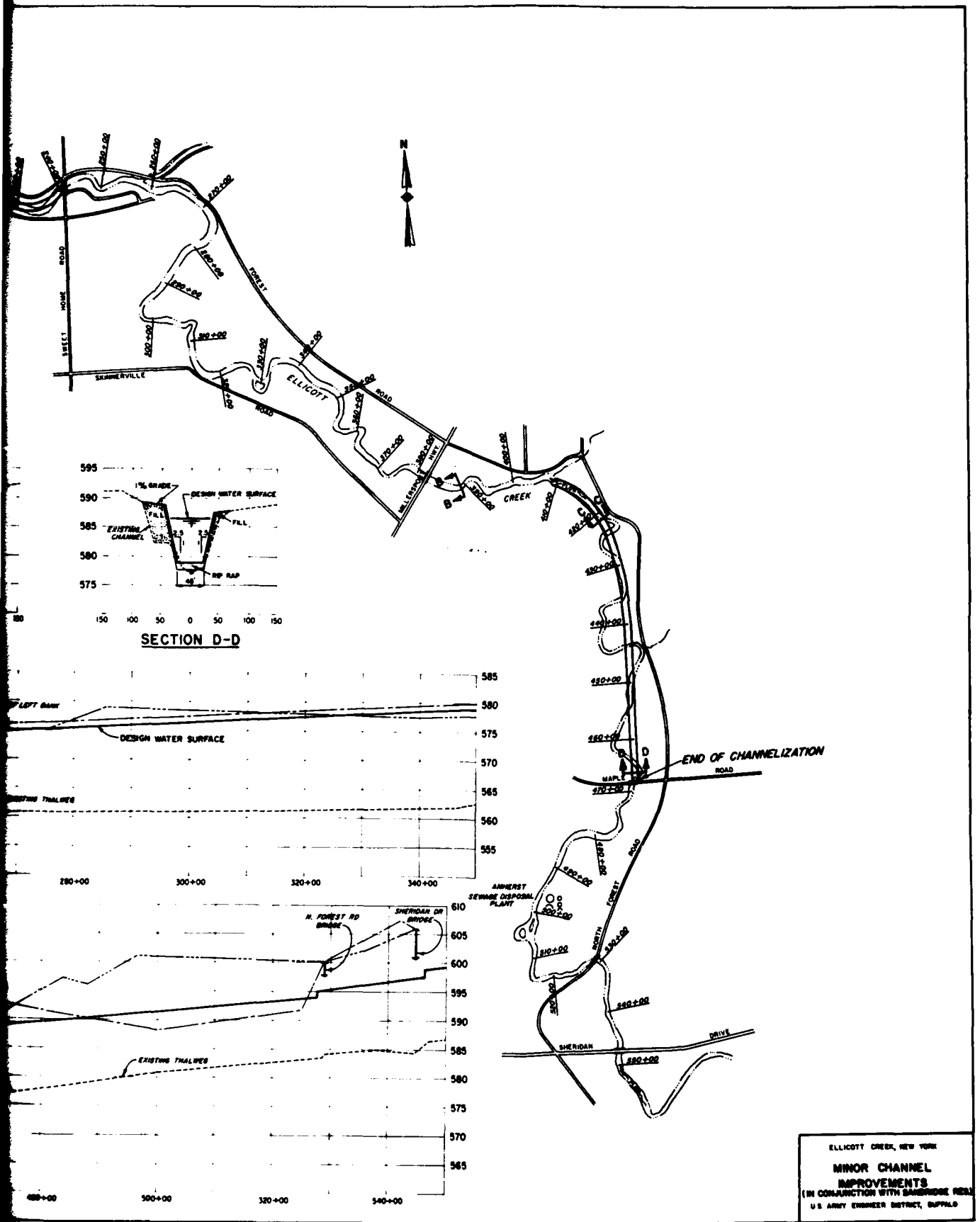


SECTION C–C





PROFILE



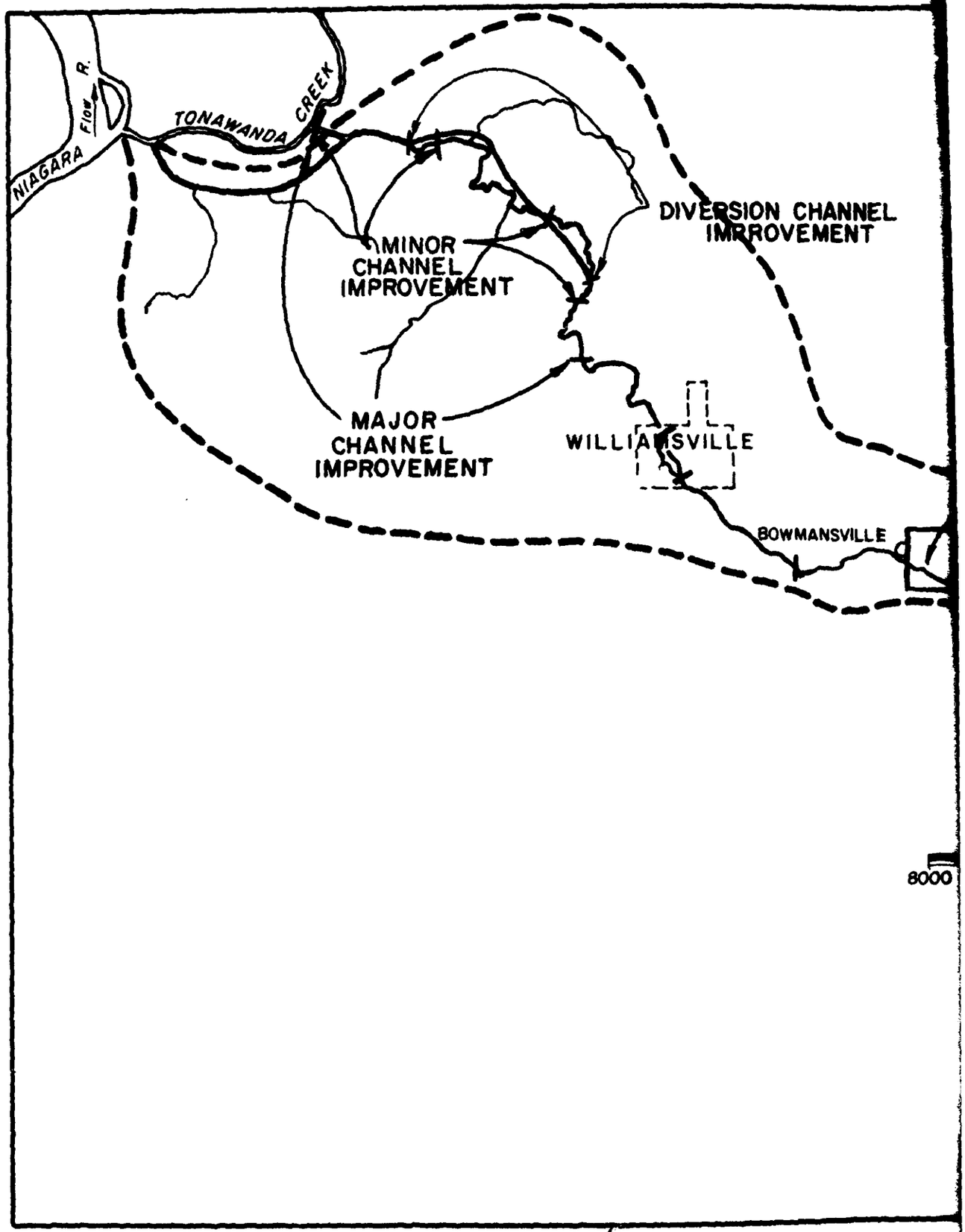
ELLICOTT CREEK, NEW YORK

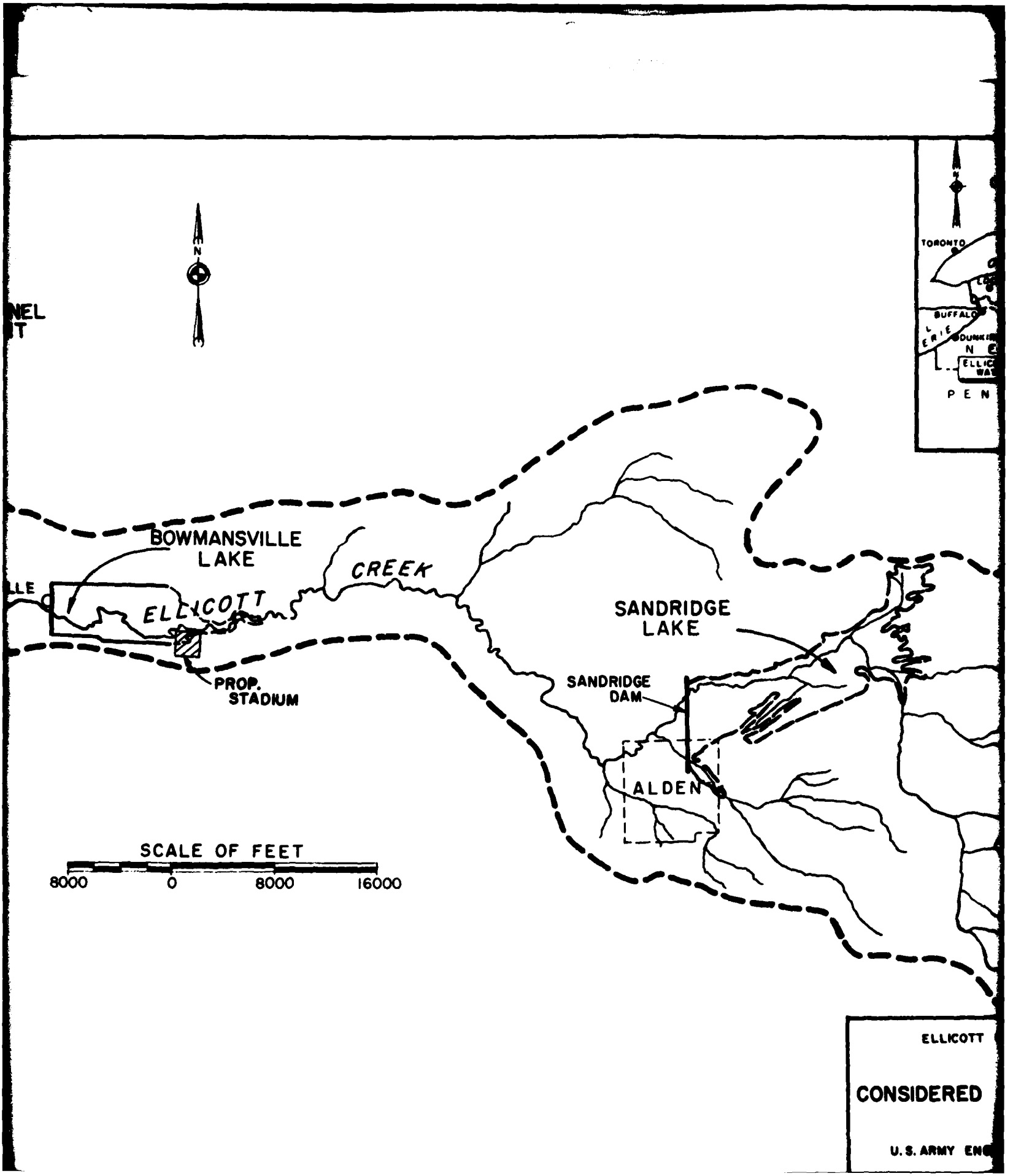
MINOR CHANNEL IMPROVEMENTS

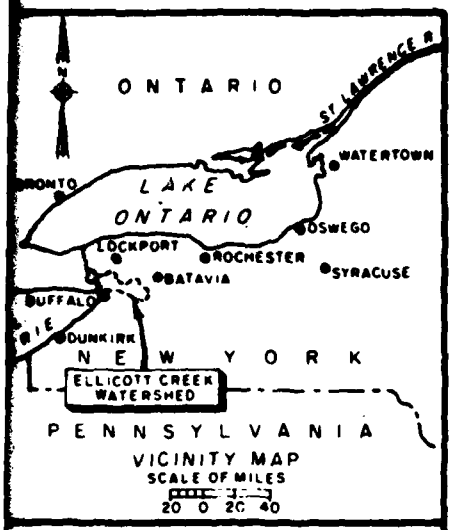
(IN CONJUNCTION WITH SAMBRIDGE REL)

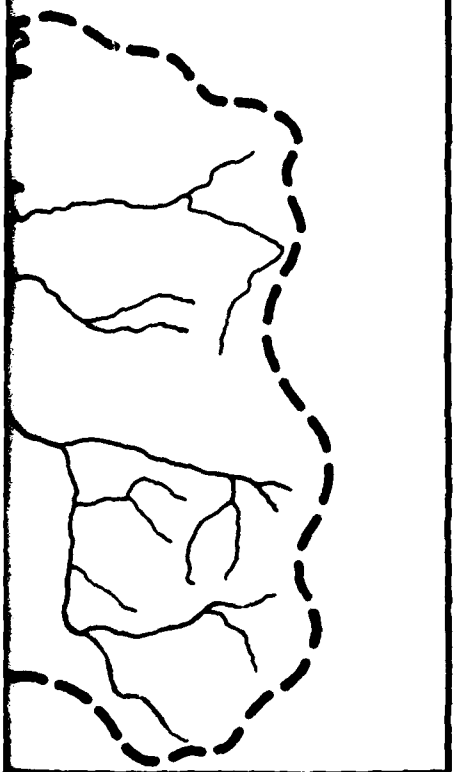
U.S. ARMY ENGINEER DISTRICT, BUFFALO

PLATE 6


NIAGARA R.
FLOW
TONAWANDA CREEK
DIVERSION CHANNEL IMPROVEMENT
MINOR CHANNEL IMPROVEMENT
MAJOR CHANNEL IMPROVEMENT
WILLIAMSVILLE
BOWMANSVILLE
8000


N
TORONTO
BUFFALO
L ERIE
P E N
BOWMANSVILLE LAKE
CREEK
ELLICOTT
SANDRIDGE LAKE
PROP. STADIUM
SANDRIDGE DAM
ALDEN
SCALE OF FEET
8000 0 8000 16000
ELLICOTT
CONSIDERED
U. S. ARMY ENG



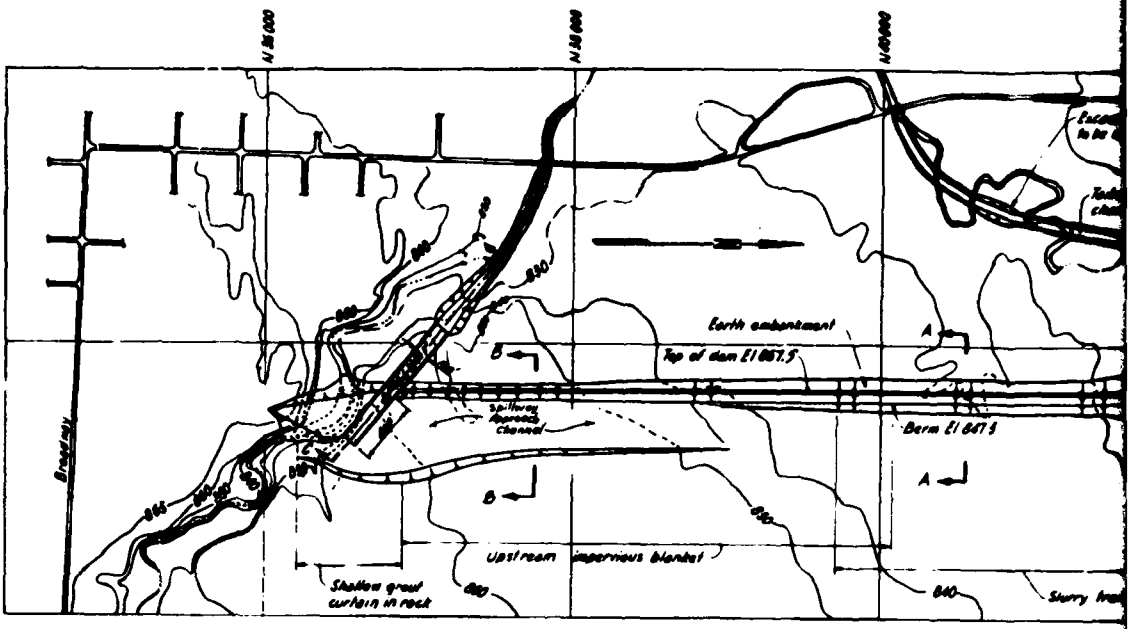


ELLICOTT CREEK, NEW YORK

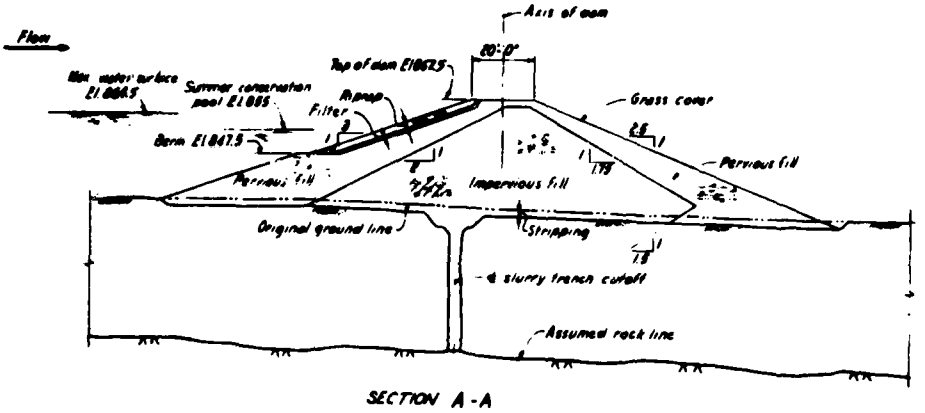
ERED IMPROVEMENTS

MY ENGINEER DISTRICT, BUFFALO

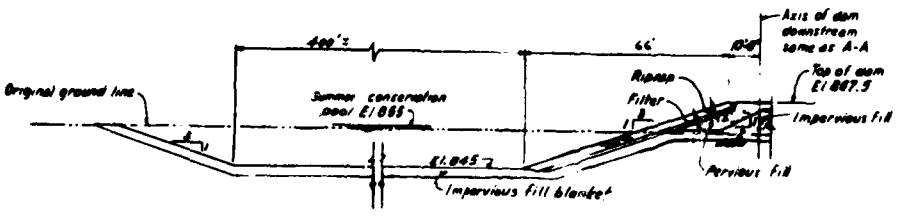
PLATE 7



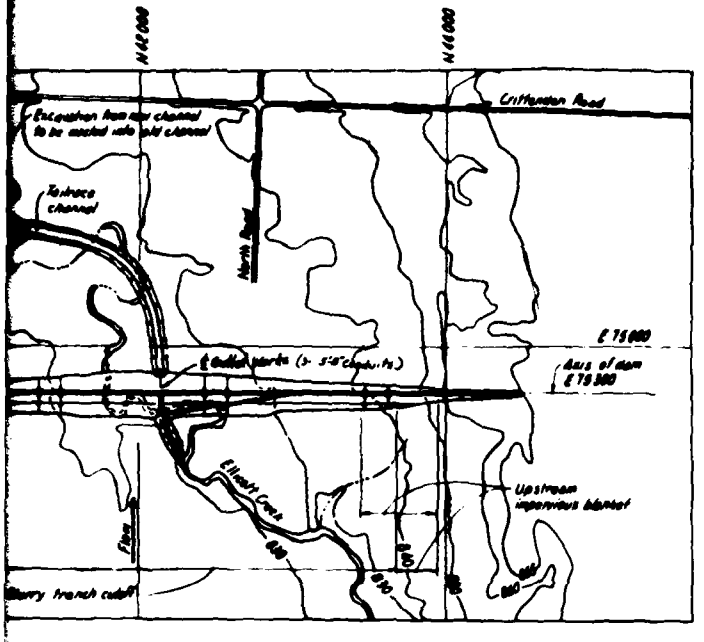
PLAN

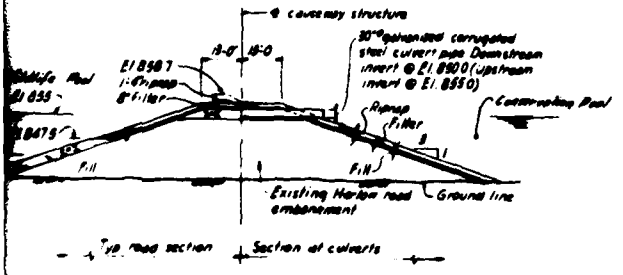


SECTION A-A

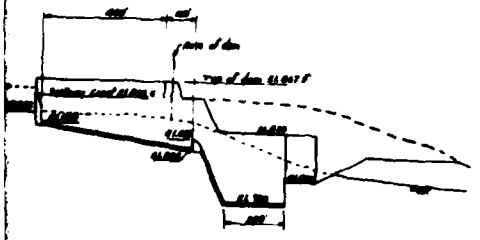


SECTION B-B





HARLOW ROAD
(Overflow Section)



SECTION C-C

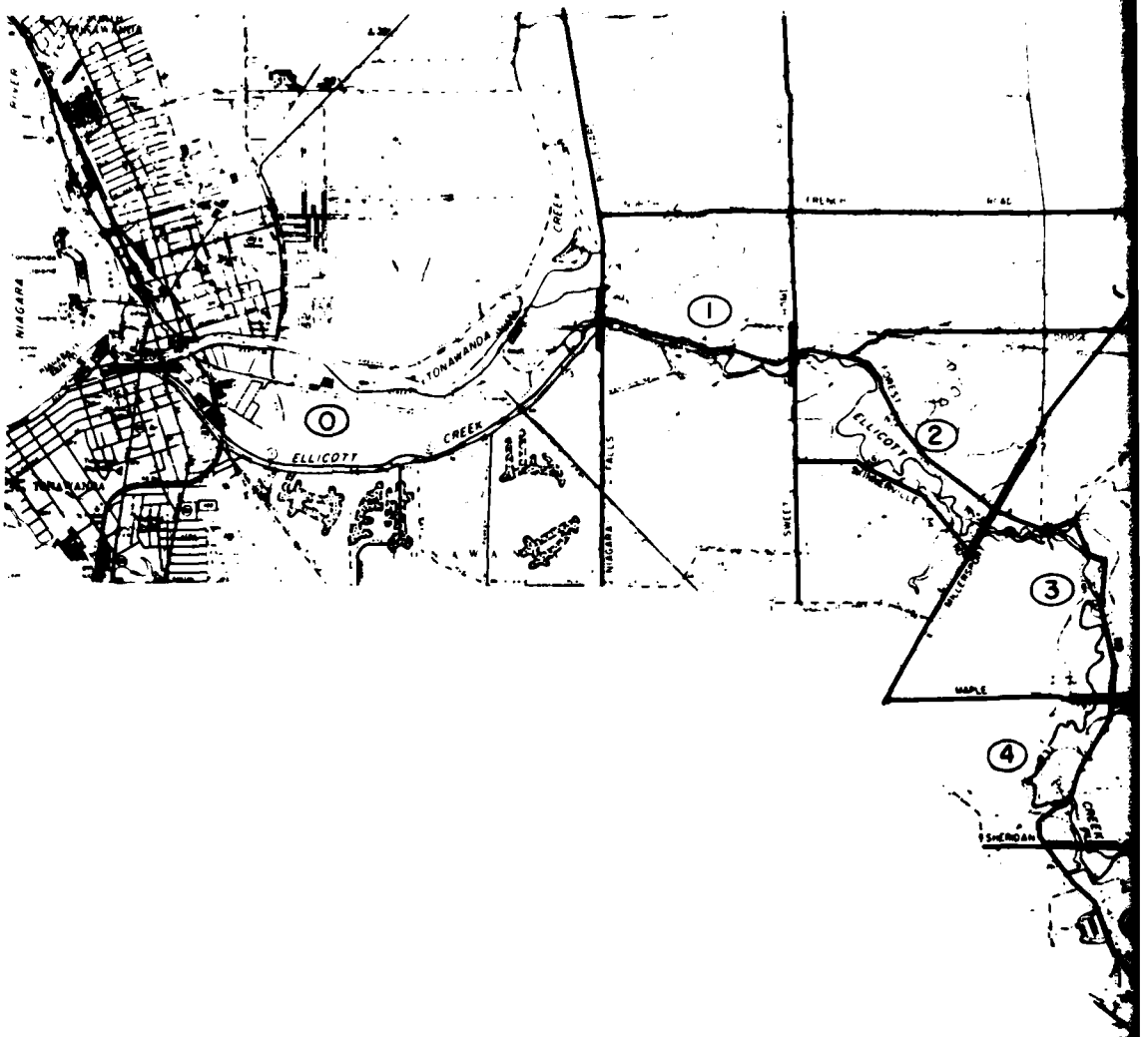
Scale 0 20 40 Feet
Except as shown

ELLICOTT CREEK, NEW YORK

SANDRIDGE DAM PLAN AND SECTION AND HARLOW ROAD SECTION

U.S. ARMY ENGINEER DISTRICT, BUFFALO

PLATE 8



LEGEND

⑥ DISTANCE FROM MOUTH IN MILES

(3) DAMAGE REACH

MARCH 1960 FLOOD LINE

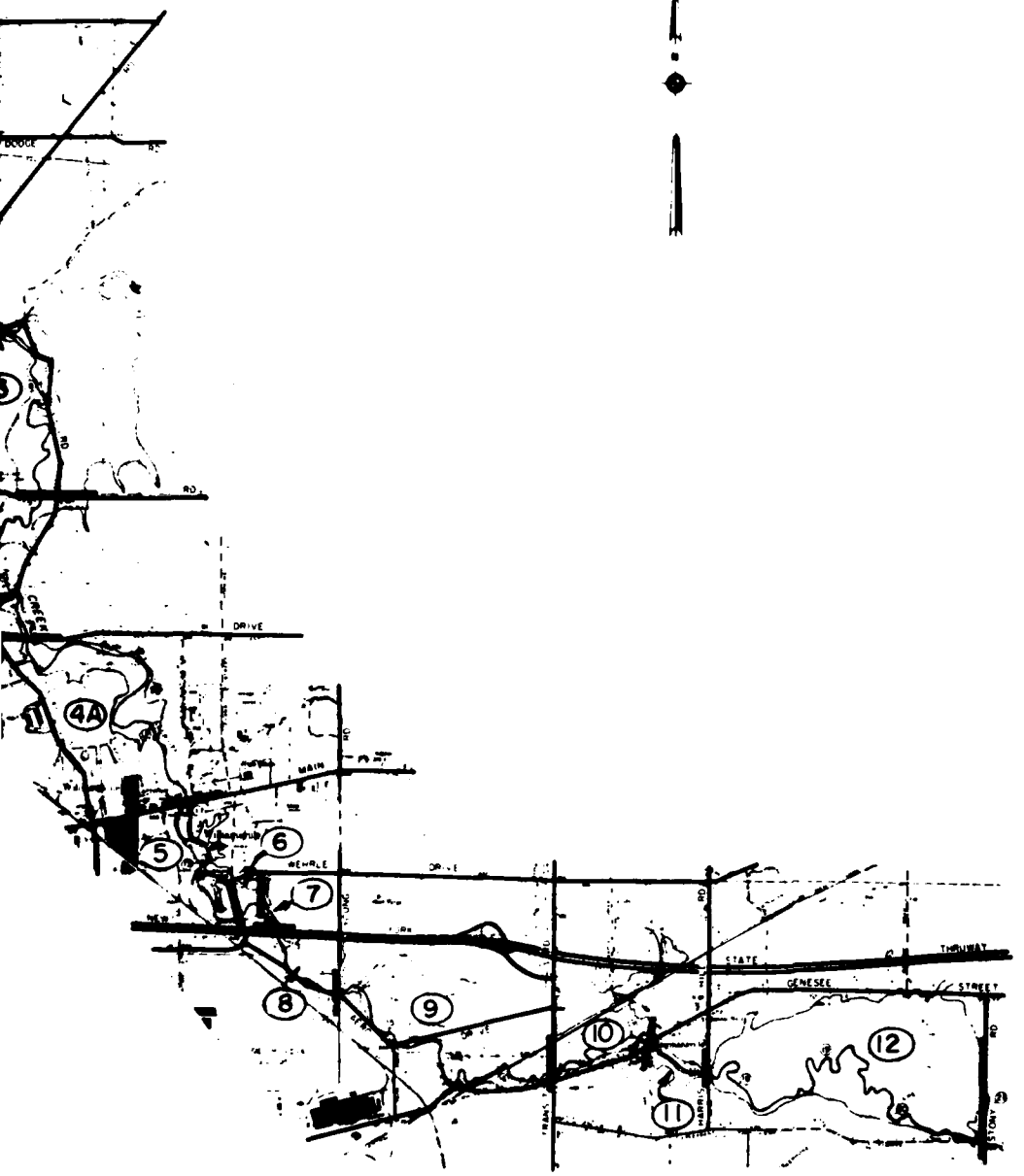
LIMITS OF DAMAGE REACHES

SCALE OF MILES

1/0 0 1

SCALE OF FEET

2000 0 2000 4000 6000 8000



ELLICOTT CREEK, N. Y.

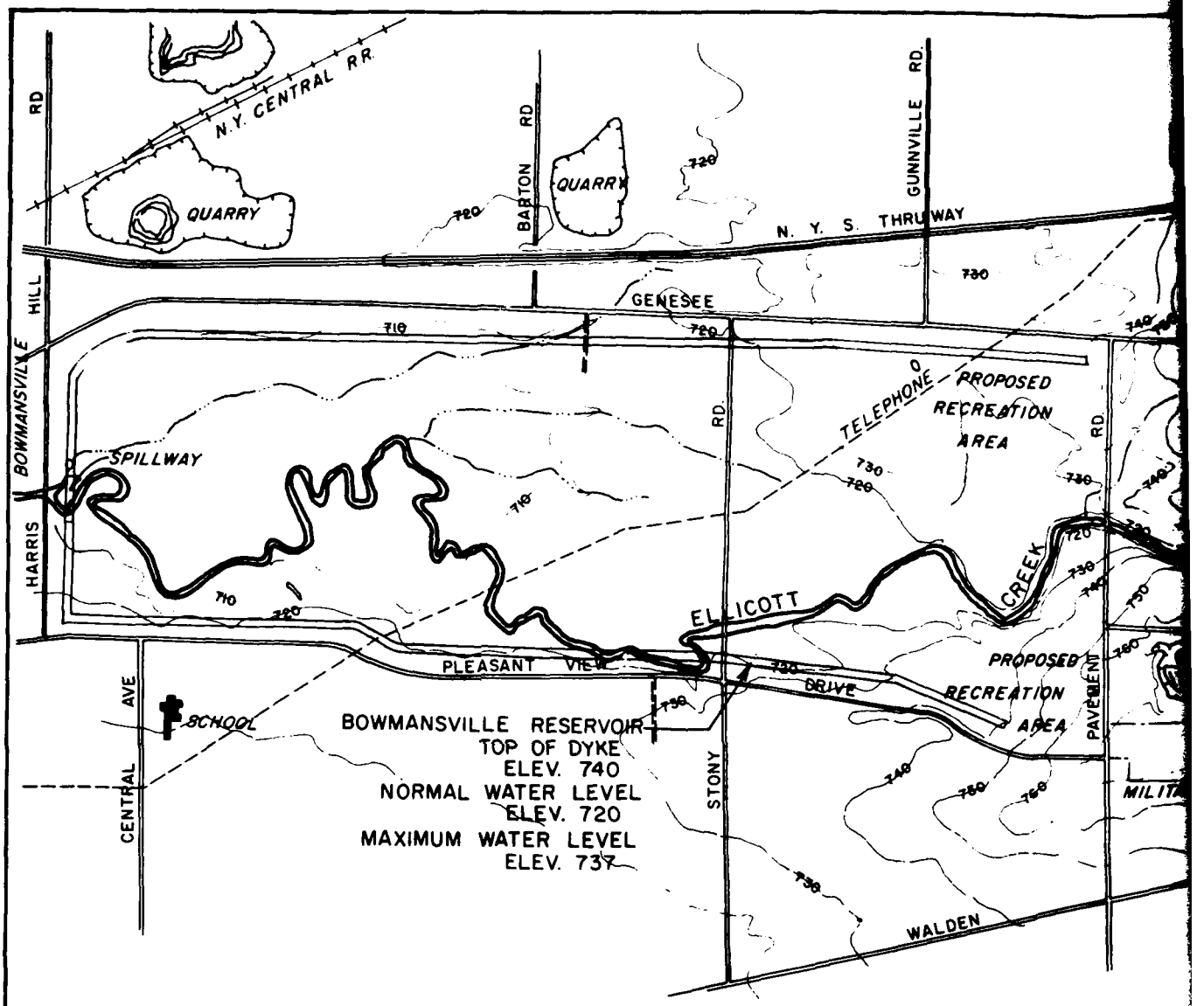
DAMAGE REACHES AND FLOODED AREA MAP

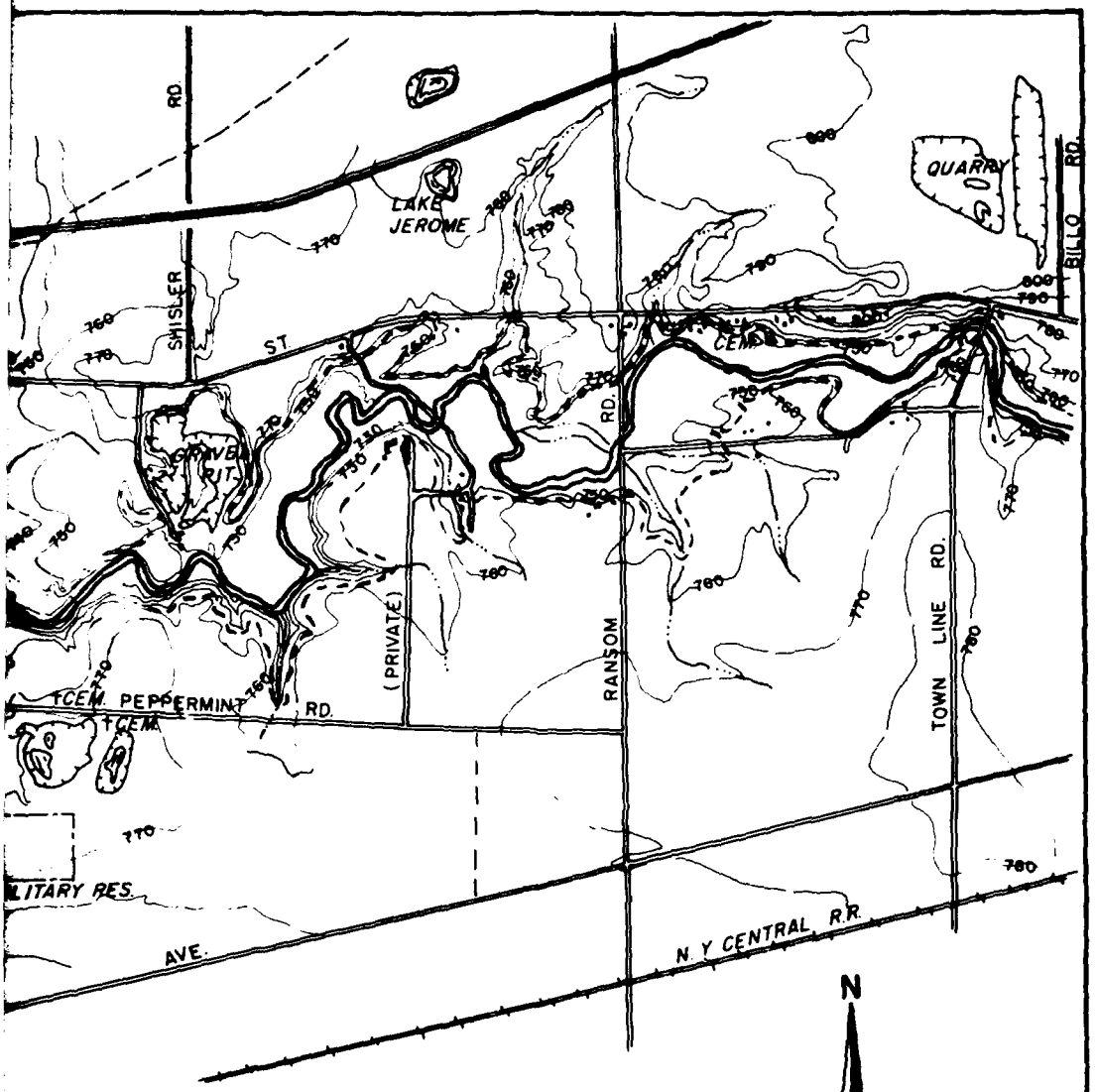
U S ARMY ENGINEER DISTRICT, BUFFALO

TO ACCOMPANY SURVEY REPORT

DATED 1970

PLATE 9


N.Y. CENTRAL RR.
QUARRY
QUARRY
BARTON RD.
GUNNVILLE RD.
N. Y. S. THRUWAY
GENESEE
BOWMANSVILLE HILL RD.
HARRIS RD.
SPILLWAY
TELEPHONE
PROPOSED RECREATION AREA
ELLICOTT CREEK
PLEASANT VIEW DRIVE
PROPOSED RECREATION AREA
SCHOOL
CENTRAL AVE
STONY RD.
PAVEMENT
WALDEN
BOWMANSVILLE RESERVOIR
TOP OF DYKE
ELEV. 740
NORMAL WATER LEVEL
ELEV. 720
MAXIMUM WATER LEVEL
ELEV. 737



ELLICOTT CREEK, NEW YORK

BOWMANSVILLE LAKE

U.S. ARMY ENGINEER DISTRICT, BUFFALO

PLATE 10

1 2